





THE IMPERIAL ENCYCLOPEDIA AND DICTIONARY

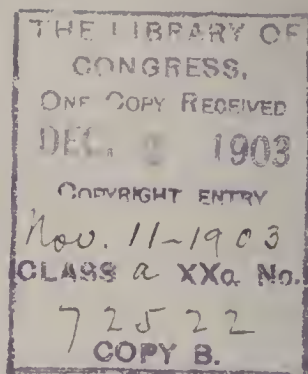
A LIBRARY OF UNIVERSAL
KNOWLEDGE AND AN UN-
ABRIDGED DICTIONARY OF
THE ENGLISH LANGUAGE
UNDER ONE ALPHABET

IN FORTY VOLUMES

VOLUME 15
FLORENCE—GALVANISM

NEW YORK HENRY G. ALLEN & COMPANY

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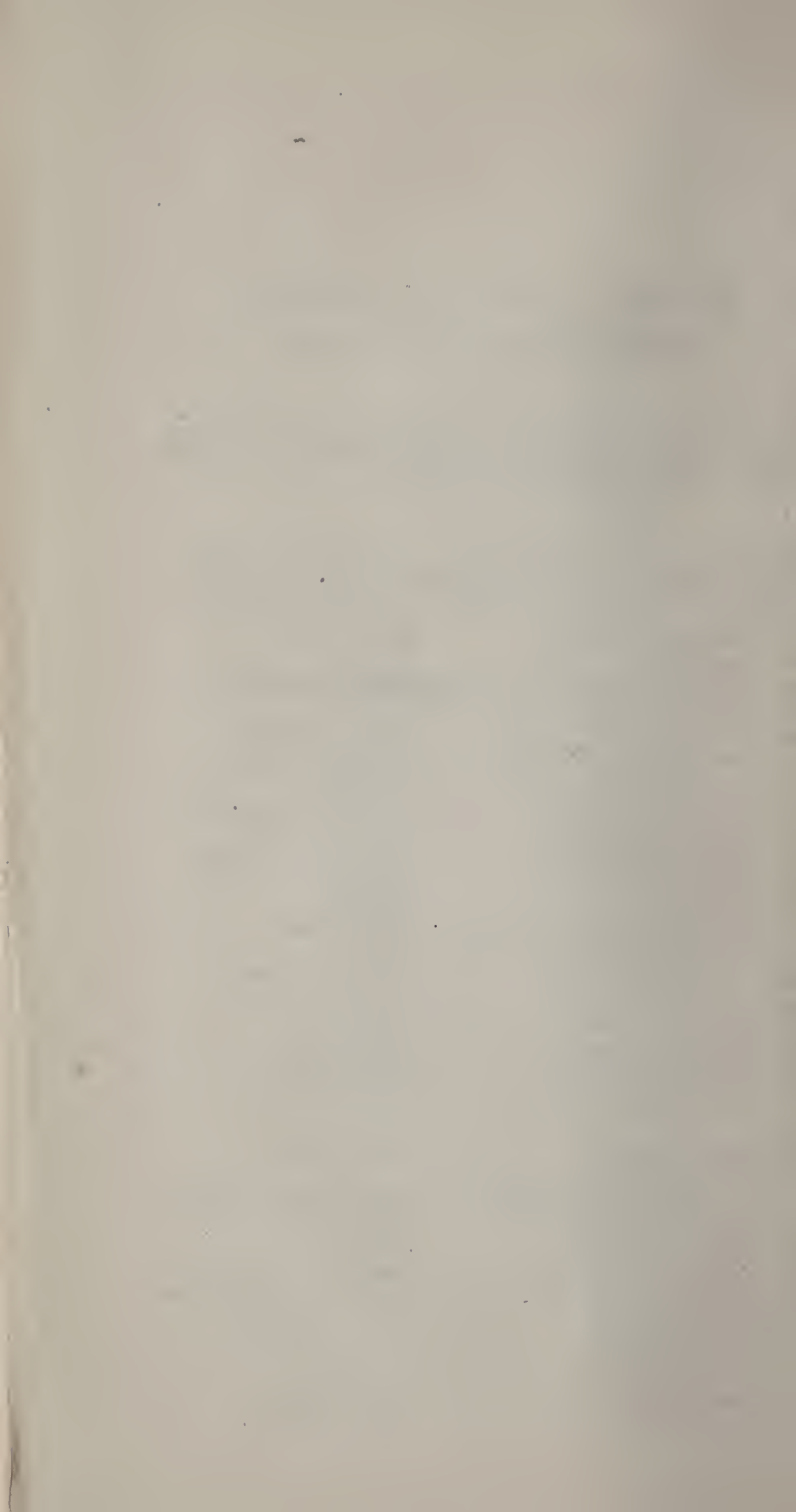
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SCHEME OF SOUND SYMBOLS

FOR THE PRONUNCIATION OF WORDS.

Note.—(·) is the mark dividing words respelt phonetically into syllables: ('), the accent indicating on which syllable or syllables the accent or stress of the voice is to be placed.

Sound-symbols employed in Respelling.	Representing the Sounds as exemplified in the Words.	Words respelt with Sound-symbols and Marks for Pronunciation.
ā...	mate, fate, fail, aye.....	māt, fāt, fāl, ā.
ă...	mat, fat.....	măt, făt.
â...	far, calm, father.....	fâr, kâm, fâ'thēr.
ã...	care, fair.....	câr, fâr.
aw...	fall, laud, law.....	faul, lawd, law.
ē...	mete, meat, feet, free.....	mēt, mêt, fêt, frē.
ě...	met, bed.....	mět, béd.
é...	her, stir, heard, cur.....	hēr. stēr, hērd, kēr.
î...	pine, ply, height.....	pîn, plî, hît.
ï...	pin, nymph, ability.....	pîn, nîmf, â-bîl'î-tî.
ō...	note, toll, soul.....	nôt, tōl, sōl.
ö...	not, plot.....	nôt, plôt.
ô...	move, smooth.....	môv, smôth.
ö...	Goethe (similar to e in her).....	gö'téh.
ow...	noun, bough, cow.....	noun, bow, kow.
oy...	boy, boil.....	boy, boyl.
û...	pure, dew, few.....	pûr, dû, fû.
ũ...	bud, come, tough.....	bûd, kûm, tûf.
ú...	full, push, good.....	fûl, pûsh, gûd.
ü...	French plume, Scotch guid.....	plûm, gûd.
ch...	chair, match.....	châr, mäch.
ch...	German buch, Heidelberg, Scotch loch (guttural).....	bôch, hî'del-bêrch, lôch.
g...	game, go, gun.....	gām, gō, gûn.
j...	judge, gem, gin.....	jûj, jēm, jîn.
k...	king, cat, cot, cut.....	kîng, kăt, kôt, kût.
s...	sit, scene, cell, city, cypress.....	sît, sên, sêl, sît'î, sî'prēs.
sh...	shun, ambition.....	shûn, âmbîsh'ûn.
th...	thing, breath.....	thîng, brêth.
th...	though, breathe.....	thō, brêth.
z...	zeal, maze, muse.....	zêl, māz, mûz.
zh...	azure, vision.....	âzh'ér, vîzh'ûn.



ABBREVIATIONS USED IN THIS WORK

a., or adj....adjective
A.B......Bachelor of Arts
abbr......abbreviation, abbreviated
abl. or abla.ablative
Abp......Archbishop
abt......about
Acad......Academy
acc. or ac.accusative
accom......accommodated, accommodation
act......active
A.D......in the year of our Lord [*Anno Domini*]
Adj......Adjutant
Adm......Admiral
adv. or ad.adverb
A. F......Anglo-French
Ag......Silver [*Argentum*]
agri......agriculture
A. L......Anglo-Latin
Al......Aluminium
Ala......Alabama
Alb......Albanian
alg......algebra
A.M......before noon [*ante meridiem*]
A.M......Master of Arts
Am......Amos
Amer......America, -n
anat......anatomy, anatomical
anc......ancient, anciently
AN. M......in the year of the world [*Anno Mundi*]
anon......anonymous
antiqu......antiquity, antiquities
aor......aorist, -ic
app......appendix
appar......apparently
Apr......April
Ar......Arabic
arch......architecture
archæol......archæology
arith......arithmetic
Ark......Arkansas
art......article
artil......artillery
AS......Anglo-Saxon
As......Arsenic
Assoc......Association
asst......assistant
astrol......astrology
astron......astronomy
attrib......attributive
atty......attorney
at. wt......atomic weight
Au......Gold [*Aurum*]

A.U.C......in the year of the building of the city (Rome) [*Annourbis conditæ*]
Aug......August
aug......augmentative
Aust......Austrian
A. V......authorized version [of Bible, 1611]
avoir......avoirdu pois
B......Boron
B......Britannic
b......born
Ba......Barium
Bart......Baronet
Bav......Bavarian
bl.; bbl......barrel; barrels
B.C......before Christ
B.C.L......Bachelor of Civil Law
B.D......Bachelor of Divinity
bef......before
Belg......Belgic
Beng......Bengali
Bi......Bismuth
biog......biography, biographical
biol......biology
B.L......Bachelor of Laws
Bohem......Bohemian
bot......botany, botanical
Bp......Bishop
Br......Bromine
Braz......Brazilian
Bret......Breton
Brig......Brigadier
Brit......British, Britannica
bro......brother
Bulg......Bulgarian
bush......bushel, bushels
C......Carbon
c......century
Ca......Calcium
Cal......California
Camb......Cambridge
Can......Canada
Cant......Canterbury
cap......capital
Capt......Captain
Card......Cardinal
carp......carpentry
Cath......Catholic
caus......causative
cav......cavalry
Cd......Cadmium
Ce......Cerium
Celt......Celtic
cent......central
cf......compare [*confer*]
ch or chh......church

ABBREVIATIONS.

Chal.....	Chaldee	diff.....	different, difference
chap.....	chapter	dim.....	diminutive
chem.....	chemistry, chemical	dist....	district
Chin.....	Chinese	distrib....	distributive
Chron.....	Chronicles	div.....	division
chron.....	chronology	doz.....	dozen
Cl.....	Chlorine	Dr.....	Doctor
Class.....	Classical [= Greek and Latin]	dr.....	dram, drams
Co.....	Cobalt	dram.....	dramatic
Co.....	Company	Dut. or D...	Dutch
co.....	county	dwt.....	pennyweight
cog.....	cognate [with]	dynam or	
Col.....	Colonel	dyn.....	dynamics
Col.....	Colossians	E.....	Erbium
Coll.....	College	E. or e.....	East, -ern, -ward
colloq.....	colloquial	E. or Eng.	English
Colo.....	Colorado	Eccl.....	Ecclesiastes
Com.....	Commodore	eccl. or	{ ecclesiastical [af- eccles.... } fairs]
com.....	commerce, commercial	ed.....	
com.....	common	ed.....	edited, edition, editor
comp.....	compare	e.g.....	for example [ex gratia]
comp.....	composition, compound	E. Ind. or	{ East Indies, East E. I.... } Indian
compar.....	comparative	elect.....	
conch.....	conchology	Emp....	Emperor
cong.....	congress	Encyc.....	Encyclopedia
Congl.....	Congregational	Eng. or E.	English
conj.....	conjunction	engin.....	engineering
Conn or Ct.	Connecticut	entom....	entomology
contr.....	contraction, contracted	env. ext....	envoy extraordinary
Cop.....	Coptic	ep.....	epistle
Cor.....	Corinthians	Eph.....	Ephesians
Corn.....	Cornish	Episc.....	Episcopal
corr.....	corresponding	eq. or =...	equal, equals
Cr.....	Chromium	equiv.....	equivalent
crystal.....	crystallography	esp.....	especially
Cs.....	Cæsium	Est.....	Esther
ct.....	cent	estab.....	established
Ct. or Conn.	Connecticut	Esthon....	Esthonian
Cu.....	Copper [Cuprum]	etc.....	and others like [et cetera]
cwt.....	a hundred weight	Eth.....	Ethiopic
Cyc.....	Cyclopedia	ethnog....	ethnography
D.....	Didymium	ethuol....	ethnology
D. or Dut..	Dutch	et seq.....	and the following [et sequentia]
d.....	died	etym.....	etymology
d. [l. s. d.]	penny, pence	Eur.....	European
Dan.....	Daniel	Ex.....	Exodus
Dan.....	Danish	exclam....	exclamation
dat.....	dative	Ezek.....	Ezekiel
dau.....	daughter	Ezr.....	Ezra
D. C.....	District of Columbia	F.....	Fluorine
D. C. L.....	Doctor of Civil [or Common] Law	F. or Fahr.	Fahrenheit
D. D.....	Doctor of Divinity	f. or fem...	feminine
Dec.....	December	F. or Fr....	French
dec.....	declension	fa.....	father
def.....	definite, definition	Fahr. or F.	Fahrenheit
deg.....	degree, degrees	far.....	farrierv
Del.....	Delaware	Fe.....	Iron [Ferrum]
del.....	delegate, delegates	Feb.....	February
dem.....	democratic	fem or f.	feminine
dep.....	deputy	fig.....	figure, figuratively
dep.....	deponent	Fin.....	Finnish
dept.....	department	F.—L.....	French from Latin
deriv.....	derivation, derivative	Fla.....	Florida
Deut.....	Deuteronomy	Flem.....	Flemish
dial.....	dialect, dialectal	for.....	foreign
diam.....	diameter	fort.....	fortification
Dic.....	Dictionary	Fr. or F....	French
		fr.....	from

ABBREVIATIONS.

freq.....frequentative
 FrisFrisian
 ft.....foot, feet
 fut.....future
 G. or Ger...German
 GGlucinium
 GaGallium
 GaGeorgia
 GaelGaelic
 GalGalatians
 galgallon
 galv.....galvanism, galvanic
 gard.....gardening
 gen.....gender
 GenGeneral
 GenGenesis
 gengenitive
 Geno.....Genoese
 geog .. .geography
 geol.....geology
 geom.....geometry
 GerGerman, Germany
 Goth.....Gothic
 Gov.....Governor
 govt.....government
 GrGrand, Great
 Gr.....Greek
 gr.....grain, grains
 gramgrammar
 Gr. Brit...Great Britain
 Gris.....Grisons
 gungunnery
 HHegira
 H.....Hydrogen
 h.....hour, hours
 Hab.....Habakkuk
 HagHaggai
 H. B. M....His [or Her] Britan-
 nic Majesty
 Heb.....Hebrew, Hebrews
 her.....heraldry
 herpet.....herpetology
 Hg.....Mercury [*Hydrar-*
 gyrum]
 hhd.....hogshead, hogsheads
 Hind.....Hindustani, Hindu,
 or Hindi
 hist.....history, historical
 HonHonorable
 hort.....horticulture
 HosHosea
 Hung.....Hungarian
 Hydros....Hydrostatics
 I.....Iodine
 I.; IsIsland : Islands
 IcelIcelandic
 ichth .. .ichthyology
 IdaIdaho
 i.e.....that is [*id est*]
 Ill.....Illinois
 illus.....illustration
 impera or
 impr.....imperative
 impers.....impersonal
 impf or imp imperfect
 impf. p. or
 impimperfect participle
 improp.....improperly
 In.....Indium
 in... ..inch, inches
 incept.....inceptive
 IndIndia, Indian
 IndIndiana

ind.....indicative
 indefindefinite
 Indo-Eur...Indo-European
 inf.....infantry
 inf or infin.infinite
 instr.....instrument, -al
 int... ..interest
 intens.....intensive
 interj. or
 int.....interjection
 interrog...interrogative pro-
 noun
 intr. or
 intrans...intransitive
 Io... ..Iowa
 Ir.....Iridium
 Ir.....Irish
 Iran.....Iranian
 irrirregular, -ly
 Is.....Isaiah
 ItItalian
 Jan.....January
 Jap.....Japanese
 Jas.....James
 Jer.....Jeremiah
 Jn.....John
 Josh.....Joshua
 Jr.... ..Junior
 JudgJudges
 K.....Potassium [*Kalium*]
 K.....Kings [in Bible]
 K.....king
 Kan.....Kansas
 Kt.....Knight
 Ky.....Kentucky
 L.....Latin
 L.....Lithium
 l. [l. s. d.], } pound, pounds
 or £..... } [sterling]
 La.....Lanthanum
 La.....Louisiana
 Lam.....Lamentations
 LangLanguedoc
 lang... ..language
 Lap.... ..Lapland
 latlatitude
 lb.; llb. or } pound : pounds
 lbs..... } [weight]
 Let.....Lettish
 Lev.Leviticus
 LG.....Low German
 L.H.D.....Doctor of Polite Lit
 erature
 Lieut.....Lientenant
 LimLimousin
 LinLinnæus, Linnæan
 litliteral, -ly
 litliterature
 Lith.....Lithuanian
 lithog.....lithograph, -y
 LL.....Late Latin, Low
 Latin
 LL.D.....Doctor of Laws
 long.....longitude
 Luth.....Lutheran
 M.....Middle
 M.....Monsieur
 m.....mile, miles
 m. or masc.masculine
 M.A.....Master of Arts
 Macc.Maccabees
 machmachinery
 Mag.....Magazine

ABBREVIATIONS.

Maj.....Major	N. A., or
Mal.....Malachi	N. Amer.North America, -n
Mal.....Malay, Malayan	nat.....natural
manuf.....manufacturing, manufacturers	naut.....nautical
Mar.....March	nav.....navigation, naval af- fairs
masc or m.masculine	Nb.....Niobium
Mass.....Massachusetts	N. C. or
math.....mathematics, math- ematical	N. Car...North Carolina
Matt.....Matthew	N. D.....North Dakota
m.d.....Doctor of Medicine	Neb.....Nebraska
MD.....Middle Dutch	neg.....negative
Md.....Maryland	Neh.....Nehemiah
ME.....Middle English, or Old English	N. Eng....New England
Me.....Maine	neut or n...neuter
mech.....mechanics, mechan- ical	Nev.....Nevada
med.....medicine, medical	N.Gr.....New Greek, Modern Greek
mem.....member	N. HNew Hampshire
mensur...mensuration	NHG.....New High German [German]
Messrs. or	NiNickel
MM.....Gentlemen, Sirs	N. J.....New Jersey
metal.....metallurgy	NLNew Latin, Modern Latin
metaph...metaphysics, meta- physical	N. Mex....New Mexico
meteor....meteorology	N. T., or
Meth.....Methodist	N. Test...New Testament
Mex.....Mexican	N. Y.New York [State]
Mg.....Magnesium	nom.....nominative
M.Gr.....Middle Greek	Norm. F ..Norman French
MHG.....Middle High Ger- man	North. E ..Northern English
Mic.....Micah	Norw... ..Norwegian, Norse
MichMichigan	Nov.....November
mid.....middle [voice]	Num.....Numbers
Milan.....Milanese	numis.....numismatics
mid. L. or { Middle Latin, Me- ML..... { diæval Latin	O.....Ohio
milit. or	O.....Old
mil.... ..military [affairs]	O.....Oxygen
minminute, minutes	Obad.....Obadiah
mineral...mineralogy	obj.....objective
Minn.....Minnesota	obs. or †...obsolete
Min. Plen..Minister Plenipoten- tiary	obsoles....obsolescent
Miss.....Mississippi	O.Bulg....Old Bulgarian or Old Slavic
ML. or { Middle Latin, Me- mid. L... { diæval Latin	Oct.....October
MLG.....Middle Low German.	Odontog...odontography
Mlle.....Mademoiselle	OE.....Old English
Mme.....Madam	OF or
Mn.....Manganese	O. Fr....Old French
Mo.....Missouri	OHG.....Old High German
Mo.....Molybdenum	Ont.....Ontario
mod.....modern	opt... ..optics, optical
MontMontana	Or.....Oregon
Mr.....Master [Mister]	ordorder
Mrs.....Mistress [Missis]	ord.... ..ordnance
MS.; MSS..manuscript; manu- scripts	org.....organic
Mt.....Mount, mountain	orig.....original. -ly
mus.....music	ornith.....ornithology
mus.doc....Doctor of Music	OsOsmium
myth.....mythology, mytho- logical	OS.Old Saxon
N.....Nitrogen	O. T., or
N. or n.....North, -ern, -ward	O. Test...Old Testament
nnoun	Oxf.....Oxford
n or neut...neuter	oz.....ounce, ounces
NaSodium [Natrium]	P.....Phosphorus
Nah.....Nahum	p.; pp.....page; pages
	p., or part..participle
	Pa. or Penn.Pennsylvania
	paintpainting
	palæon....palæontology
	parlparliament
	pass.....passive

ABBREVIATIONS.

pathol or
 path.....pathology
 Pb.....Lead [*Plumbum*]
 Pd.....Palladium
 Pena or Pa. Pennsylvania
 perf.....perfect
 perh.....perhaps
 Pers.....Persian, Persic
 pers.....person
 persp.....perspective
 pert.....pertaining [to]
 Pet.....Peter
 Pg. or Port. Portuguese
 phar.....pharmacy
 PH.D.....Doctor of Philoso-
 phy
 Phen.....Phenician
 Phil.....Philippians
 Philem.....Philemon
 philol.....philology, philologi-
 cal
 philos. { philosophy, philo-
 or phil... } sophical
 phonog.....phonography
 photog.....photography
 phren.....phrenology
 phys.....physics, physical
 physiol... physiology, phys-
 ological
 Pied.....Piedmontese
 Pl.....Plate
 pl. or plu...plural
 Pl. D.....Platt Deutsch
 plupf.....pluperfect
 P.M.....afternoon [*post meri-
 diem*]
 pneum.....pneumatics
 P. O.....Post-office
 poet.....poetical
 Pol.....Polish
 pol econ...political economy
 polit.....politics, political
 pop... ..population
 Port. or Pg. Portuguese
 poss.....possessive
 pp.....pages
 pp.....past participle, per-
 fect participle
 p. pr.....present participle
 Pr. or Prov. Provençal
 pref.....prefix
 prep... ..preposition
 Pres.....President
 pres.....present
 Presb.....Presbyterian
 pret.....preterit
 prim.....primitive
 priv.....privative
 prob.....probably, probable
 Prof.....Professor
 pron.....pronoun
 pron.....pronunciation, pro-
 nounced
 prop.....properly
 pros.....prosody
 Prot... ..Protestant
 Prov. or Pr. Provençal
 Prov.....Proverbs
 prov.....province, provincial
 Prov. Eng. Provincial English
 Prus.....Prussia, -n
 Ps.....Psalm, Psalms
 psychol...psychology

pt.....past tense
 pt.....pint
 Pt.....Platinum
 pub.....published, publisher,
 publication
 pwt.....pennyweight
 Q.....Quebec
 qt.....quart
 qtr.....quarter [weight]
 qu.....query
 q.v.....which see [*quod
 vide*]
 R.....Rhodium
 R.....River
 Rb.....Rubidium
 R. Cath....Roman Catholic
 rec. sec....recording secretary
 Ref.....Reformed
 refl.....reflex
 reg.....regular, -ly
 regt.....regiment
 rel. pro. or
 rel.....relative pronoun
 repr.....representing
 repub.....republican
 Rev... ..Revelation
 Rev.....The Reverend
 Rev. V.....Revised Version
 rhet.....rhetoric, -al
 R. I.....Rhode Island
 R. N.....Royal Navy
 Rom.....Roman, Romans
 Rom.....Romanic or Ro-
 mance
 Rom. Cath. { Roman Catholic
 Ch. or R. } Church
 C. Ch.... }
 r.r.....railroad
 Rt. Rev...Right Reverend
 Ru.....Ruthenium
 Russ.....Russian
 r.w.....railway
 S.....Saxon
 S.....Sulphur
 s.....second, seconds
 s. [l. s. d.]..shilling, shillings
 S. or s.....South, -ern, -ward
 S. A. or
 S. Amer..South America, -n
 Sam.....Samaritan
 Sam.....Samuel
 Sans, or
 Skr.....Sanskrit
 Sb.....Antimony [*Stibium*]
 s.c.....understand, supply,
 namely [*scilicet*]
 S. C. or
 S. Car....South Carolina
 Scand.....Scandinavian
 Scot.....Scotland, Scotch
 scr.....scruple, scruples
 Scrip.....Scripture [s], Scrip-
 tural
 sculp.....sculpture
 S. D.....South Dakota
 Se.....Selenium
 sec.... ..secretary
 sec.....section
 Sem.....Semitic
 Sep.....September
 Serv.....Servian
 Shaks.....Shakespeare
 Si.....Silicon

ABBREVIATIONS.

Sic.....	Sicilian	trigon.....	trigonometry
sing.....	singular	Turk.....	Turkish
sis.....	sister	typog.....	typography, typo- graphical
Skr. or		U.....	Uranium
Sans.....	Sanskrit	ult.....	ultimate, -ly
Slav.....	Slavonic, Slavic	Unit.....	Unitarian
Sn....	Tin [<i>Stannum</i>]	Univ.....	Universalist
Soc.....	Society	Univ.....	University
Song Sol...	Song of Solomon	U. Presb...	United Presbyterian
Sp.....	Spanish	U. S....	United States
sp. gr.....	specific gravity	U. S. A....	United States Army
sq.....	square	U. S. N....	United States Navy
Sr.....	Senior	Ut.....	Utah
Sr.....	Strontium	V.....	Vanadium
.....	Saint	v.....	verb
.....	street	Va.....	Virginia
stat.....	statute	var.....	variant [word]
S.T.D.....	Doctor of Sacred Theology	var.....	variety of [species]
subj.....	subjunctive	Ven.....	Venerable
suf.....	suffix	Venet.....	Venetian
Su. Goth...	Suo-Gothic	vet....	veterinary
superl.....	superlative	v. i. or	
Supp.....	Supplement	v. intr....	verb intransitive
Supt.....	Superintendent	vil.....	village
surg.....	surgery, surgical	viz.....	namely, to-wit [<i>vide-</i> <i>licet</i>]
Surv.....	surveying	v. n.....	verb neuter
Sw.....	Swedish	voc.....	vocative
Swab.....	Swabian	vol.....	volume
sym.....	symbol	vols.....	volunteers
syn.....	synonym, -y	Vt.....	Vermont
Syr.....	Syriac, Syrian	v. tr.....	verb transitive
t.....	town	W.....	Tungsten [<i>Wolfram</i>]
Ta....	Tantalum	W....	Welsh
Tart.....	Tartar	W. or w....	West, -ern, -ward
Te.....	Tellurium	Wal.....	Walachian
technol...	technology	Wall.....	Walloon
teleg.....	telegraphy	Wash.....	Washington
Tenn.....	Tennessee	Westph...	Westphalia, -n
term.....	termination	W. Ind. }	West Indies, West or W. I... } Indian
terr.....	territory	Wis.....	Wisconsin
Teut.....	Teutonic	wt.....	weight
Tex.....	Texas	W. Va.....	West Virginia
Th.....	Thorium	Wyo.....	Wyoming
theat.....	theatrical	Y.....	Yttrium
theol.....	theology, theological	yd.....	yard
therap.....	therapeutics	yr.....	year
Thess.....	Thessalonians	Zech.....	Zechariah
Ti.....	Titanium	Zeph.....	Zephaniah
Tim.....	Timothy	Zn.....	Zinc
Tit.....	Titus	zool.....	zoology, zoological
Tl.....	Thallium	Zr.....	Zirconium
toxicol...	toxicology		
tp.....	township		
tr. or trans.	transitive		
transl.....	translation, trans- lated		

See also ABBREVIATIONS: in Vol. I.

IMPERIAL ENCYCLOPEDIA AND DICTIONARY.

FLORENCE OF WORCESTER, *flôr'ens ov wûs'ter*: lived in the latter part of the 11th c.; d. 1118. He was a monk at Worcester, and compiled a *Chronicle*, which begins with the creation of the world and comes down to the year of his death. For the history of his own time, his work has high value.

FLORENCE-FLASK: flask of thin glass with a large globular body and long narrow neck, in which Florence-oil is exported from Italy.

FLORENCE-OIL: superior kind of olive-oil prepared at Florence.

FLORENTINE, *a. flôr'ën-tîn*: of or from Florence, in Italy: N. a native of. **FLORENTINE-EXPERIMENT**, an experiment made in 1661 by some academicians at Florence to test whether water was compressible or not. They inclosed it in a globe of thin gold, hermetically sealed. In compressing the globe the water, instead of yielding, forced its way through the pores of the gold and stood in drops on its outer surface. **FLORENTINE-FRESCO**, kind of painting for decorating walls, first practiced at Florence during the flourishing period of Italian art. **FLORENTINE-LAKE**, pigment prepared from cochineal. It is not now in use, having given place to the more durable lake prepared from madder. **FLORENTINE MOSAIC**, name given to the art of inlaying tables and other plane surfaces with *pietra dura* (q. v.) and *pietra commerse*, carried on principally at Florence. **FLORENTINE-RECEIVER**, form of receiver for the results of the distillation of essential oils. **FLORENTINE-SCHOOL**, in *painting*, school of art remarkable for attitudes seeming in motion; for dark severity; for an expression of strength by which grace is perhaps excluded; and for a character of design approaching the gigantic. **FLORENTINE-WORK**: same as **FLORENTINE-MOSAIC**.

FLORES, *flôr'ès*: island in the Malayan Archipelago, about half way between Java and the e. extremity of the chain; due s. from Celebes; 8°—9° s. lat., and 120°—123° e. long. Like most members of the group, it is oblong, 200 m. in length by an average breadth of 35, and is hilly

FLORES—FLORICULTURE.

and of volcanic origin. It produces cotton, sandalwood, and bees-wax; and its principal trade is with Singapore.

FLORES: most westerly island of the Azores; lat. $39^{\circ} 25'$ n., and long. $31^{\circ} 12'$ w. Pop. abt. 10,000.

FLORES: island in the Pacific, a little to the w. of Vancouver Island; lat. $49^{\circ} 20'$ n., and long. 126° west.

FLORES: island in the river Plata, about 20 m. below Monte Video, in the republic of Uruguay; lat. $34^{\circ} 56'$ s. and long. $55^{\circ} 55'$ west.

FLORESCENCE, FLORET, FLORICULTURE, FLORID, FLORIST, etc.: see under FLORA.

FLORIAN, *flō'rĭ-an*, SAINT: abt. 190–230; b. Zeiselmauer, Austria: patron saint of Poland. He was of Christian parentage; became a capt. in the Roman army, and, because of his uncompromising Christianity during the persecutions by the Emperor Diocletian, was drowned in the river Enns, near Larch, in Austria. His remains were buried on the site of the present magnificent Augustinian abbey of St. F., near Enns. His bones were subsequently removed to Rome, where they remained undisturbed till 1183, when a portion or all was presented to King Casimir of Poland, who had them reverently preserved at Cracow. F. has since been venerated as the patron saint of Poland, his day being Aug. 4.

FLORICULTURE: propagation and management of flowering plants. In a rude way F. has been pursued by many tribes and peoples which had made little progress in the arts. As civilization advances, flowers are more extensively cultivated and their quality is greatly improved. In many countries F. has become a prominent industrial pursuit. Accurate statistics cannot be obtained, but it is known that the flower trade of a few of the leading cities in this country, reaches many millions of dollars every year while that of London is said to average \$25,000 per day. It is probable that closer, though by no means so general, attention is given to flowers than is bestowed on the most valuable grains, the choicest fruits, or the most useful vegetables. A single plant of a new and promising flower frequently sells for several thousand dollars. In various European and Asiatic countries vast quantities of flowers are grown for the manufacture of various perfumes. Roses, violets, and heliotropes are among the varieties most extensively cultivated for this purpose. Certain kinds of flowers, as the Camomile, are used for medicinal purposes. The Chinese have long been noted for their skill in F., and the people of India and Japan also are quite proficient therein.

For its beneficent influence on the taste and character, as well as for the pleasure which it confers, the pursuit of F. in connection with the ordinary business of life is to be commended. While many exotics require a degree of care and protection from adverse influences which only those who have conservatories (see CONSERVATORY) can bestow, there are a large number of hardy varieties, both beautiful and fragrant, which the owner of the smallest garden can

cultivate easily and successfully. Plants can be obtained from seed or, for a small sum, may be purchased from a florist. The land should be rich and free from stagnant water. It should be deeply dug, finely pulverized, and liberally enriched with well rotted manure or, what is much better, a suitable commercial fertilizer. If seeds are used, the sowing should not be done until the ground is dry and warm. Only a shallow covering of earth is required, but it must be firmly packed upon the seeds. If plants are purchased they should not be put out too early in the spring. Weeds must never be allowed to grow in the flower bed, and if drought prevails water should be carefully given at night. It should be applied when the surface becomes dry and before the plants begin to wilt. Enough should be given at a time to thoroughly moisten the earth around the roots, but none should stand upon the surface. When the blossoms are fully formed they should be removed, as the plant will be weakened and the production of flowers checked by allowing seed to form. Many fine and popular varieties of flowers may be made to bloom in open ground in summer, also in the house during the winter. They should be planted out in spring, in six or seven inch pots, the holes in the bottom having been previously closed. In the autumn they can be removed without injury to the roots. A large number of half-hardy flowers can be readily grown without artificial heat by giving a little extra care and occasional protection, while tender plants can be grown in a green-house (q.v.) at moderate cost. Many varieties of flowers can be grown with fine effect on balconies and verandas. In these locations creeping plants and vines to hang over the railings, and vigorous plants with upright forms, showy foliage and bright flowers, make a fine appearance. Window gardening (q.v.) also furnishes a comparatively easy method of growing many choice varieties of flowers, while ferns and other plants requiring a moist atmosphere are successfully grown in Wardian Cases (q.v.).

Various methods of arranging flowering plants in ornamental grounds are adopted. Of these the "carpet style" is now the most popular for extensive ornamentation. Plants are selected which grow only a few inches high, and of various colors. They are set so closely as to cover the ground, and the different parts of the bed are separated by strips of turf which contrast clearly and beautifully with the color of the flower. As an immense number of plants are required and much labor and skill needed in the arrangement, this is a very costly style of landscape decoration. Four beds at Long Branch, N. J., a few years ago, in the private grounds of a New York gentleman were said to contain a million and a half of plants, and were so finely arranged that they presented a scene of marvelous beauty. Ribbon planting, giving lines of color by the side of roads or walks and planting in masses, a large number of plants of the same color being used together, are much cheaper methods as the plants cost less and, on account of their greater vigor, can be set farther apart, while the work of planting and caring for them is greatly diminished. The

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system of massing flowers was introduced about 50 years ago. The individuality of the plant is lost, but if properly arranged, the mass of color makes a beautiful display.

Propagation of flowers is effected by seeds, bulbs, cuttings from the wood or roots, layers, or divisions of the roots, according to the character and habits of growth of the variety to be multiplied. As cuttings, or slips, from the unripe growth of most plants can be readily made to grow, their use is a favorite method of propagation. As a rule when the stem will break if an attempt to bend it is made, it is in the best condition to use, but woody plants, as roses, should be more mature. Slips should be started in sand that is kept constantly soaked with water. A saucer holding sand an inch or two in depth may be used. It should be kept in a warm room and in the sunlight as much as possible. As soon as roots are formed, usually in from one to three weeks, the cuttings should be placed in small pots filled with fine, rich soil. As size increases they may be transferred to larger pots. Cuttings will root more readily in spring than in mid-summer. New varieties are secured by accidental variations, by hybridization (see HYBRID) and from seedlings. Improvement is effected by the selection and careful cultivation of the finest specimens through a series of years. Wonderful changes in appearance have thus been effected; some of the finest double flowers with brilliant hues having been obtained from varieties which in the wild state had but few petals and dull colors.

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FLORIDA, *flōr'ī-da*, Sp. *flo-rē'thā*: a state, one of the U. S. of America, 14th in order of admission into the Union, 12th in area, 32nd in pop. (1900), 1st in orange production, 3rd in sugar and molasses, 6th in rice, 10th in cotton; popularly known as the 'peninsular state.'

Location and Area.—This most south. of the states is between lat. $24^{\circ}30'$ and 31° n., long. $79^{\circ}48'$ and $87^{\circ}38'$ w.; bounded n. by Ga. and Ala., e. by the Atlantic Ocean, s. by the Gulf of Mexico and Strait of F., w. by the Gulf and Perdido river; length of peninsula 375 m., width average 90 m.; 58,680 sq. m. (37,555,200 acres); water-surface, permanent, 2,841,600 acres, occasional, over 9,000,000 acres. F. is divided into 45 counties.

Topography.—F. has a longer coast-line than any other state—472 m. on the Atlantic, 674 m. on the gulf—but owing to its numerous keys, coral reefs, and shallow soundings, has few good harbors, the best being St. Augustine and Fernandina on the Atlantic; Pensacola, Appalachicola, St. Marks, Cedar Keys, Tampa, Charlotte, and Key West on the gulf; and Jacksonville on St. John's river. The greatest elevation of the state does not exceed 200 ft. above sea level, and there are many depressions known as sinks, varying in size from a few yards to several acres. In the s. half are many lakes, swamps and marshes. The principal of the former are Okeechobee, a shallow body, area 650 sq. m.; Ahapopka; Istokpoga; Orange, Kissimee; Cypress; Lake George; Lamone; Washington; Tohopokaliga; Alligator; Dunn's; Harris; Griffin; Trati-Apopka; Jessup; Monroe; Santa Fé. and Maitland. The swamps include the Everglades, the outlet of Lake Okeechobee, 90 m. long, 30-50 m. wide, area 3,000 sq. m., which in wet weather are almost wholly submerged; the Kissimee and Cypress, n. of Lake Okeechobee; and the Okefinchee, of which two-thirds are in Ga. The chief rivers are the St. John's, remarkable for its beautiful tropical scenery; Ocklawaha; Appalachicola; and St. Marys—all navigable by steamboats. The extreme s. portion of F. terminates in a bow-shaped chain of keys covered with hard, rocky knolls and low sand-pits of sand, coral, and shells. See F. KEYS: DRY TORTUGAS.

Natural Resources.—F. is of tertiary and post-tertiary origin, based mainly on coral beds. Its chief mineral products are *coquina*, a conglomerate of broken snells, which affords a substantial building material; shell and coral limestone; pottery and brick clay; limonite iron ore, found in the largest quantity in Jackson co.; rich deposits of phosphates in Wakulla, Alachua, Marion, Hillsborough, and Manatee counties (the best in Wakulla); and lignite coal, recently discovered in Santa Rosa co., near Black water river. The best clay is in Escambia co.

Climate.—The climate is delightfully equable. Intense cold is never known, and frost is rarely seen below Orange Lake. The range of the thermometer in the n. is from 90° to 26° F., in the centre and s. from 90° to 43° l., and summer heat is tempered by the ocean and gulf. Rainfalls are copious, and variable, averaging 50 inches on the Atlan-

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tic coast and at Key West, 32 at the mouth of the Caloosahatchie river, and 75 on Appalachee Bay. The hygienic drawbacks of the state are malarial and intermittent fevers, and occasional visitations of yellow fever, that of 1888 at Jacksonville and the adjacent country being very severe and fatal. Through prompt measures by the national and various state govts., the fever was prevented obtaining any considerable lodgment in contiguous states. Despite the danger of fevers, however, F. has become one of the most popular winter resorts of citizens of the n. states: and St. Augustine, Jacksonville, and Fernandina now (1889) have some of the largest and best-appointed hotels in the world.

Zoology.—In animal life, F. is very prolific and interesting. Numerous species of birds, renowned for song and plumage, and not seen elsewhere, abound along the St. John's river and the lakes. Deer, small black bear, raccoon, opossum, manatee or sea-cow, wild turkey, alligator, crocodile (in the s.), water-fowl, cougar, panther, gray and black wolf, fox, cotton-tail deer, fish-otter, and shad, black and other bass, sheepshead, mullet, grouper, turtle, and shark are found by hunter and fisherman in accessible localities.

Agriculture, etc.—The richest soil is the hummock land, next the reclaimed hummocks, then the low hummocks, savannas, and bottom lands. Swamps, when drained and cultivated, are highly productive. In contrast with these groups are the pine barrens, on which nothing but trees and forest products thrive. Timber products include long-leaved pine, live-oak, red cedar, hickory, cypress, dogwood, bay laurel, satin-wood, lignum-vitæ, mahogany. Long and short staple cotton, Indian corn, and rice, figs, limes, lemons, guavas, pomegranates, olives, grapes, pine-apples, and bananas, and sugar cane, and tobacco are cultivated with little labor and large results. Excellent pasture grasses in the s. and w. are inexhaustibly abundant, and render the rearing of neat cattle profitable. In 1885, there were 739,952 acres of improved land in F., and 2,245,171 unimproved. The farms, in land, fences, and buildings, represented a value of \$60,884,392. The assessment returns showed products as follows: **Corn**, 420,070 acres, 3,799,000 bushels, \$2,659,300 value; **oats**, 53,611 acres, 519,000 bushels, \$347,730 value; **potatoes**, 1,938 acres, 155,000 bushels, \$155,040 value; **hay**, 528 acres, 370 tons, \$6,600 value; **cotton**, 273.473 acres, 73,837 bales, \$4,357,860 value. In 1900 there were 40,814 farms in the state, embracing 4,363,891 acres, valued at \$53,929,064. The chief productions in 1902 were: **Corn**, 5,180,640 bu., value \$3,989,093; **potatoes**, 317,160 bu., value \$386,935; **tobacco**, 1,601,080 lbs., value \$480,324; **cotton**, 67,287 bales; total value of all farm crops \$7,000,000. **Live-stock**, 1903, Jan. 1, 44,695 horses, \$2,737,863; 14,129 mules, \$1,351,258; 626,355 cattle, \$6,463,576; 99,067 sheep, \$196,253; 395,528 swine, \$1,186,584.

Manufactures.—In 1900 there were 2,056 mfg.

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establishments in F., using a capital of \$33,107,477, employing 34,230 hands, paying in wages \$10,683,038, using material valued at \$15,637,520, and yielding products worth \$36,810,243. The principal productions according to value of output were: Tobacco, cigars, and cigarettes, \$10,891,286; lumber and timber products, \$10,848,403; turpentine and rosin, \$6,469,605; railroad cars, \$1,112,245; planing mill products, \$777,782; fertilizers, \$500,239; artificial ice, \$427,762; foundry and machine shop products, \$320,507; and flour, \$302,737. The lumber industry includes the manufacture of pine lumber, red cedar window sash, ship spars, live-oak ship timber, pine orange boxes, and cedar cigar boxes. Other considerable industries are the production of naval stores (turpentine, tar, resin, pitch), distilling of turpentine, evaporation of sea-salt, taking and preparing sponges for market, preparation of alligator skins for the manufacture of boots and shoes, production of cotton-seed oil and oil-cake, fisheries (in the s.), manufacture of palmetto hats and braids, and coral fisheries.

Commerce.—There are 8 customs districts in F., of which Fernandina, Tampa, and Pensacola are the most important, the latter being the seat of the lumber trade. In 1902, the imports were \$4,285,799, exports \$20,109,349: chief exports, cotton, lumber, oranges, other fruit, and fish. Pensacola leading with commodities, valued at \$43,953,703, Fernandina, with \$3,183,550.

March 2; b. Pike co., Ind. Studied at Harvard Law

Railroads.—The development of the railroad system of F. in late years has been rapid. In 1873, there were 466 m. in operation. In 1885, there was a total of 1,603 m., of which 1,101 m. were in operation. The capital stock was \$23,568,100, funded debt \$19,135,100, total investment \$53,476,177, cost of railroads and equipment \$48,786,033. In 1886, the mileage rose to 1,701, and the total assessment of railroad property was \$11,372,016. In 1887, the legislature granted acts of incorporation to 9 new companies, and the assessment rose to \$12,752,331. 1889, Jan. 1, the total mileage was 2,326. Since 1887 all railroads in the state have been under the supervision of state commissioners.

Religion and Education.—Late statistics estimated church organizations at 550, church edifices 503, members over 50,000, divided denominationally according to membership among the Meth. Episc. (N., S., and branches), Bapt. (regular and branches), Presb (Northern, Southern., and branches) Rom. Cath., Prot. Episc., Congl., and minor sects. There were 1,724 public schools, with an average attendance of 62,327. The aggregate of the school tax on the counties, the state tax of one mill, and the common school fund was \$335,000. The cost of education of all school children of lawful age was \$5.10 per capita; for each child enrolled \$5.37. Teachers were paid \$247,138, and the total expenses of the year were \$335,984. In 1886, there were 1,919 public schools, 79,687 pupils, 1,013 male teachers, 825 female teachers, average daily attendance of pupils 44,813; (1888) 2,249 schools (512 for colored children), 84,263 enrolled pupils, 2,413 teachers, average daily attendance of

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pupils, 53,130, amount expended for schools \$484,110, common-school fund \$500,400. Beside the denominational schools and institutions there were East and West F. seminaries, State Agricultural Univ. at Lake City, colored normal schools at Tallahassee and Gainesville, and deaf, dumb, and blind asylum. In 1901 there were 2,342 public schools, 111,607 pupils enrolled, 75,325 in average daily attendance, 2,773 teachers. The value of all school property was \$970,815.

Illiteracy.—Persons 10 years old and upward enumerated (1880) 184,650, unable to read 70,219, unable to write 80,183, whites unable to read 19,763, unable to write 19,024; foreign-born whites enumerated 7,388, unable to write 739; whites 10–14 years old enumerated 17,028, unable to write 5,581, males 3,047, females 2,534; whites 15–20 years old enumerated 16,396, unable to write 3,297, males 1,755, females 1,542; whites 21 years old and upward enumerated 65,713, unable to write 10,885, males 4,706, females 6,179; colored persons 10 years old and upward enumerated 85,513, unable to write 60,420; colored 10–14 years old enumerated 15,947, unable to write 10,676, males 5,425, females 5,251; colored 15–20 years old enumerated 15,669, unable to write 9,991, males 4,392, females 5,599; colored 21 years old and upward enumerated 53,897, unable to write 39,753, males 19,110, females 20,643.

Finances and Banking.—In 1885, the bonded debt of F. amounted to \$1,275,000, comprising \$350,000 bonds of 1871 and \$925,000 of 1873, less \$207,600 in the sinking fund. In 1886, the debt remained the same, less \$218,800 in sinking fund, the state income from taxes and licenses was \$423,679 and the expenditures were \$407,806. Of the bonded debt \$625,500 were in the educational fund, \$218,800 in the sinking fund, and \$430,700 in the hands of individuals. The bonded debt, 1903, Jan. 1, was \$1,032,500, and the total assessed property valuation, 1902, reached \$103,047,937. In 1902, Sept., there were 19 national banks (cap. \$1,285,000), 25 state and savings banks (cap. of those reporting \$905,200).

History.—It is believed that F. was discovered prior to 1500, though the earliest records extant give Juan Ponce de Leon, that restless searcher after the mythical fountain of perpetual youth, the credit of having first visited and named the portion of the coast now embraced within the limits of the state. He landed at St. Augustine on Easter Sunday, 1512, and named the territory F. either because of the day of his landing, the *pascua florida* (flowery Easter), or of the great profusion of flowers that met his eye as he stepped ashore. He had no conception of the extent of the country about him, hence the name was without restrictions, and came to be employed by early Spanish writers to designate a vast expanse lying n. and w. of the immediate vicinity of St. Augustine. A short time sufficed to convince him that he was as far away as ever from the coveted fountain of youth, and he left that region to explore others. In 1516, he returned, this time determined on discovering the *eldorado*, or land of fabulous wealth in

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gold and silver; made some fruitless journeys to the interior, and set sail for Cuba. After him came Vasquez, a Spaniard, 1520, Verrazzano, a Florentine, 1523, De Garay, a Spaniard, 1524, and Pamilo de Narvaez, who received from Charles V. of Spain a grant of all land between Cape F. and Rio Panuco 1526. Narvaez landed with a considerable army at Appalachee 1528, was successfully resisted by the Indians, and, taking to his ships, was lost with all but 10 of his followers in a storm off Panuco. In 1539, Ferdinand de Soto made a landing, explored the country between the Atlantic and the Mississippi river with considerable thoroughness, and died without making any attempt at settlement 1542. During the next 20 years the Spaniards made numerous attempts to found settlements, the most successful of which was that directed by Pedro Menendez at a point just below the present St. Augustine, where a fort was built. Next came the expedition of French Protestants sent out by Admiral de Coligny, which was landed near Menendez's settlement 1563-4. In 1565, just as these refugees were beginning to experience relief from persecution, the Spaniards attacked them and, after killing nearly all, hung their bodies to the trees. 'Not as Frenchmen, but as heretics and enemies of God.' Menendez then left a garrison in the fort, and, moving n., founded St. Augustine and built another fort 1565. While engaged there, a French force under Dominique de Gourges was landed at the Huguenot settlement to avenge the Spanish murders. The garrison left by Menendez was attacked, captured, and hung on the same trees, to which an inscription was affixed 'Not as Spaniards, but as cut-throats and murderers.' In 1534, two English captains took possession of the n. coast portion in the name of England; and in 1586, Sir Francis Drake captured the fort and settlement at St. Augustine, which had been besieged unsuccessfully many times. Soon afterward, however, the place was restored to Spain and, in the absence of records to the contrary, it may be assumed that during the ensuing century that country succeeded in holding it. In 1682 La Salle established several French settlements in w. F., now La.; 1693, a French settlement was made at Pensacola; 1702, an expedition from the Carolinas attacked St. Augustine without success; 1704, a similar expedition captured Fort St. Mark; 1739, during the war between Spain and England, Gov. Oglethorpe of Ga. led an unsuccessful expedition against St. Augustine; 1742 a Spanish force from Fla. took Fort St. Simon and was investing Fort Frederica, Ga., when it was frightened off by Oglethorpe; 1763, Fla. was ceded by Spain to Great Britain in exchange for Cuba; the territory was divided into two provinces, with the Appalachicola river as the boundary, and a number of colonies were established under a royal proclamation; 1778, Gen. Prevost marched from Fla. and captured Savannah and other Ga. towns; 1779, the Spaniards successfully besieged Baton Rouge, and 1781, May, captured Pensacola. The treaty of 1783 restored Fla. to Spain. In 1803, the portion w. of the Perdido river be-

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came a possession of the United States by its treaty with France. Pensacola and Fort St. Mark were occupied by the British 1812, captured by Gen. Jackson 1818, and soon afterward restored to Spain. In 1819, negotiations were concluded between Spain and the United States for the cession of Fla. to the latter, and 1821, July, formal delivery was made. The acquisition was organized as Florida Territory 1822, and inducements to settlement were offered by the govt. A considerable immigration set in, but the hostility of the Seminole Indians (q.v.), who occupied the best lands, prevented any material development, and it was not till after the costly seven-years' war upon them 1835-42 and the removal of the greater part of the tribe to Indian Terr., that the population began to show substantial increase. In 1845, the territory was admitted as a state into the Union. The civil war history of Fla. comprises the passage of the ordinance of secession 1861, Jan. 10; the occupation by the state authorities of Fort Marion and the St. Augustine and Chattahoochee arsenals Jan. 7; and the navy-yard and forts at Pensacola, Jan. 12; the capture and subsequent possession by the national forces of Fernandina, St. Augustine, Jacksonville, and other places of importance on the Atlantic coast 1862; and the battle of Olustee, 1864, Feb. In 1865, Pres. Johnson removed the restrictions on commercial intercourse with Fla., Apr. 29, and appointed a provisional govt. July 13. The ordinance of secession was repealed Oct. 28, civil authority was recommitted to state officers 1866, Jan.; a new constitution was ratified by the people 1868, May, the 14th amendment to the federal constitution was adopted June 1, and the state readmitted to the Union July 4.

Government.—The executive authority is vested by the constitution in a gov. elected for 4 years, who must be a qualified elector, a resident of the U. S. 9 years and of F. 3 years prior to the time of his election; and a lieut. gov. elected for the same period and on the same qualifications. The state officers appointed by the gov. and confirmed by the senate are: sec. of state, treas., comptroller, attor gen., supt. public instruction, surveyor-gen., adj. gen., collector internal revenue, and commissioner of emigration. The legislative authority is vested in a senate of 32 members and house of assembly of 68, whose members receive \$6 per day and at the rate of 10 c. mileage; the judicial authority is vested in a supreme court, circuit courts, co. courts, and justices of the peace. Judges are appointed by the gov. and confirmed by the senate, those of the supreme court—a chief justice and two associates—for life or good behavior, those of the circuit courts for 8 years, and those of the co. courts for 4 years. At the present time (1897) the gov. receives a salary of \$3,500 per annum, lieut. gov. \$500, sec. of state \$2,000, treas. \$2,000, comptroller \$2,000, attor. gen. \$2,000, supt. public instruction \$2,000, adj. gen. \$2,000, commissioner of emigration \$1,200, chief justice \$3,500, associate justices \$3,000, surveyor-gen. \$1,800, collector of internal revenue \$3,000.

The successive govts. with their terms of office are as fol-

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laws: *Territorial*—Andrew Jackson 1821-2, William P. Duval 1822-34, John H. Eaton 1834-6, Richard K. Call 1836-9, Robert R. Reid 1839-41, Richard K. Call 1841-4, John Branch 1844-5; *State*—William D. Moseley 1845-9, Thomas Brown 1849-53, James E. Broome 1853-7, Madison S. Perry 1857-61, John Milton 1861-5, William Marvin (provisional) 1865-6, David S. Walker 1866-8, Harrison Reed 1868-73, O. B. Hart 1873-4, M. L. Stearns 1874-7, George F. Drew 1877-81, William D. Bloxham 1881-5, E. A. Perry 1885-9, Frank P. Fleming 1889-93, Henry L. Mitchell 1893-7, William D. Bloxham 1897-1901, William S. Jennings 1901-5.

Politics.—F. had 3 electoral votes 1848-72, and 4 since then. The votes for pres. and vice-pres. have been as follows: 1848, Taylor and Fillmore; 1852, Pierce and King; 1856, Buchanan and Breckinridge; 1860, Breckinridge and Lane; 1864, no vote; 1868, Grant and Colfax; 1872, Grant and Wilson; 1876, Hayes and Wheeler (see **ELECTORAL COMMISSION**); 1880, Hancock and English; 1884, Cleveland and Hendricks; 1888, Cleveland and Thurman; 1892, Cleveland and Stevenson; 1896, Bryan and Sewall; 1900, Bryan and Stevenson.

Population.—(1840) 54,477; (1850) 87,445; (1860) 140,424; (1870) 187,748; (1880) 269,493; (1890) 391,422; (1900) 528,542.

Counties, Cities and Towns.—F. is divided into 45 counties. In 1900 the most populous *counties* were: Duval 39,733, Alachua 32,245, Marion 24,403, Escambia 28,313, Monroe 18,006, Jackson 23,377, Leon 19,887, Hillsboro 36,013; and *cities and towns*: Key West 17,114; Jacksonville 28,429, Pensacola 17,747, Tampa 15,839, St. Augustine 4,272, Palatka 3,301, and Tallahassee 2,081.

FLORIDA, GULF OF: name given to the channel between Florida and the Bahamas, traversed by the Gulf Stream (q.v.). From Florida Reefs on the s. to Settlement Point, most northern of the Bahamas, the channel is 200 m. long; greatest breadth at the s. extremity, 150 m.; at the n. extremity, 65 miles.

FLORIDA BLANCA, *flo-rě'thá blán'ká*, DON JOSEFO MONINO, Count of: prime minister under Charles III. of Spain: 1728-1808, Nov. 20; b. Murcia, where his father was a notary. Having studied at Salamanca, he soon gained such distinction that he was appointed Spanish ambassador to Clement XIV. of Rome. In that office, he showed great ability, especially in the abolition of the order of Jesuits and the election of Pius VI. Monino, whom the king created count of Florida Blanca, succeeded Grimaldi as Spanish minister of foreign affairs, and was given charge also of the department of matters of justice and mercy, as well as the superintendence of posts, highways, and public magazines. F. used this extensive authority in introducing post-coaches and good post-roads, attending to important departments of general police, and actively promoting the arts and sciences. His effort to confirm the good understanding between Spain and Portugal by a double marriage, which would have secured the Portuguese throne to a

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Spanish prince, was unsuccessful. His military undertakings also, the attack upon Algiers 1777, and the siege of Gibraltar 1782, issued unfortunately. Before the king's death 1788, Oct., F. presented a defense of his administration, with a request for leave to resign. The defense was accepted, but the request refused. However, under Charles IV. 1792, F.'s enemies obtained his disgrace. Imprisoned at first in the citadel of Pampeluna, he was afterward released, and banished to his estates. He appeared again at the meeting of the cortes 1808, but died November 20 of the same year.

FLORIDA KEYS: cluster of small islands of coral formation and of sandbanks, almost continuous in range, extending in the form of a bow from Cape Florida in a s.w. direction 220 m. They are partly in Dade and partly in Monroe co., and are very numerous. The extreme w. group is the Dry Tortugas (q.v.), and the most important of the others are Cayo Larga and Cayo Hueso, known also as Bone Key, Thompson's Island, and Key West. The latter contains the city of Key West. The F. K. in the main are very rocky, lie but a few feet above tide water, and are covered with pine, buttonwood, sweet bay, palmetto, and other trees. Some have a soil in which tropical fruits thrive; others are wholly barren: and one, Salt Key, derives its name from a large lake of exceedingly salt water.

FLORID COUNTERPOINT: in *mus.*, counterpoint not confined to any special species, but in which notes of various lengths are used. It is opposed to strict counterpoint: see COUNTERPOINT.

FLORID'Æ: see CERAMIACEÆ.

FLORID GOTHIC: in *arch.*, florid English or Tudor, the latest development of the Gothic style in England: the period is 1400–1537.

FLORIDIA, *flō-rē'dē-ā*: town of Sicily, 7 m. w.n.w. from Syracuse; in a wide plain, amidst vineyards, olive-groves, and corn fields. Pop. 8,500.

FLORIN, n. *flōr'in* [F. *florin*—from It. *florino*: Ger. *floren*]: gold coin struck first in Florence (q.v.) in the 13th c.; of the size of a ducat, and having on one side a lily, and on the other the head of John the Baptist. Some derive the name from the city, others from the flower. These coins were soon imitated all over Europe. From them the German gold guldens of the middle ages and the modern guldens arose: the last are still marked by the letters *Fl.* The gulden or florin is the unit of account in Austria, and has a value of about 48 cents. Till 1875 an F. or gulden of abt. 40 cents was the unit in the s. German states. The Dutch F. or guilder also is worth abt. 40 cents. The English 2s. (= abt. 48 cents) piece is called florin.

FLORINIANS, *flō-rin'ī-anz*: Gnostic sect of the 2d c.: so called from a Roman priest, Florinus, who, with his fellow-presbyter Blastus, introduced doctrines resembling those of Valentinus, into Rome, in the pontificate of Eleutherius (176), and was excluded from communion by that pontiff: see GNOSTICISM: VALENTINIANS.

FLORISTS' FLOWERS—FLORUS.

FLORISTS' FLOWERS: kinds of flowers which have been cultivated with peculiar care, and of which, consequently, there exist numerous varieties, differing very much in appearance from each other and from the original flower. Such are tulips, hyacinths, roses, auriculas, carnations, anemones, ranunculuses, dahlias, etc. The special cultivation of particular flowers was prosecuted to a remarkable degree in Europe first by the Dutch in the beginning of the 17th c., and from the Netherlands a passion for it extended to other countries, particularly England and Scotland, when the religious persecutions drove many refugees to the British shores; and to this day it prevails most where the branches of manufacture introduced by the refugees are carried on. In the little gardens of operatives in some manufacturing towns are seen many of the finest tulips and carnations in Britain. It is still, however, in Holland, particularly at Haarlem, that this branch of gardening is carried on to the greatest extent, and it is from that quarter chiefly that the market of the world is supplied with bulbs, seeds, etc. Between Alemsei and Leyden are more than 20 acres appropriated to hyacinths alone, which succeed best in a loose sandy soil. The cultivation of roses at Noordwyll, s. Holland, is carried on in considerable fields situated in the *dunes*, and affords support to many families. Berlin has of late years become the seat of a flower-trade, which partially rivals that of Holland. Some flowers, as dahlias and hollyhocks, are produced in greatest perfection by British cultivators; some others by American florists. The Chinese have had their florists' flowers, camellias, hydrangeas, tree peonies, etc., from time immemorial.

In 1636-7, an extraordinary flower-mania prevailed in Holland, with reference chiefly to tulips, in which men speculated as recently in railway shares. Bulls were sold for enormous sums. For a single *Semper Augustus* (a tulip), 13,000 florins were once paid, and for three such together, 30,000 florins. The ownership of a bulb was often divided into shares. Men sold bulbs, which they did not possess, on condition of delivering them to the buyers within a stipulated time; and of some varieties, far more bulbs were sold than actually existed. But these extravagances soon ceased, though not till they had involved many persons in ruin.—It was not till about 1776 that the real flower-trade of Holland reached its greatest importance; from which time it has rather declined. New varieties of tulips and hyacinths are sometimes marked in the Haarlem catalogues at prices from 25 to 150 florins.

FLORUS, *flō'rūs*: generally, but on insufficient evidence, called L. Annæus F.: Roman historian in the reign of Trajan or Hadrian. Of his life we know nothing. He wrote an epitome of Roman history (*Epitome de Gestis Romanorum*), from the foundation of the city to the time of Augustus. This work, which is extant, is carefully and intelligently composed, but is disfigured by an inflated and metaphorical style. Since the *editio princeps*—if, indeed, it be such—printed at the Sorbonne 1471. F.'s epitome has been pub-

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lished times without number. The best modern editions are those of Jahn (Leip. 1852) and Halm (1854).

FLOSCULAR, a. *flōs'kū-lēr*, or **FLOSCULOUS**, a. *-lūs* [L. *flosculūs*, a little flower—from *flōs*, a flower]: in *bot.*, applied to the corolla of a floret when tubular. **FLOSCULE**, n. *-kūl*, the partial or lesser floret.

FLOSCULARIDÆ, n. *flōs-kū-lār-ī'dē* [L. *flosculus*, a little flower]: family of rotifera, order *Sessilia*; distinguished by having bent spiniform teeth at the orifice of the esophagus.

FLOS-FERRI, n. *flōs-fēr'rī* [L. *flos*, a flower; *ferri*, of iron]: a mineral, a fine radiated variety of arragonite—so named because of its frequent association with iron ore.

FLOSH, n. *flōsh* [probably connected with Ger. *flösse*, a trough in which ore is washed]: in *metal.*, a hopper-shaped box in which ore is placed for the action of the stamps. The side of the box has a shutter, which is raised or lowered to allow the ore to escape when it has acquired the desired fineness.

FLOSS, n. *flōs* [It. *floscio*; Venet. *flosso*; Piedm. *flos*, faint, drooping; F. *flosche*, weak, soft; Lang. *flosso*, soft untwisted silk]: the downy or silky substance found in the husks of certain plants. **FLOSSY**, a. *-sī*, soft and silk-like. **FLOSS-SILK**, a kind of loose inferior silk, obtained from the external envelope of the silkworm's cocoon and from the downy silk waste broken in reeling. Macerated in water, pressed and dried, it is spun into yarn for the coarser silk or mixed goods.

FLOTAGE, n. *flō'tāj* [F. *flottage*, rafting, buoyancy—from *flot*, a wave, a billow (see **FLOAT**, and **FLEET** 1 and 2)]: the act of floating; that which floats. **FLOT'ANT** [F.]: in *heraldry*, said of an object flying in the air, as a banner-flotant. **FLOTATION**, n. *flō-tā'shūn*, the act of floating; the science of floating bodies. **FLOTSAM**, n. *flōt'sām*, or **FLOAT'SAM**, n. *-sām*, and **FLOT'SON**, n. *-sūn* [Icel. *floti*, a float, a raft, *samr*, together, like]: goods cast out in shipwreck, by force of the wind or sea, and found floating without an owner on a river or sea—*jetsam*, goods found sunken in the water, or washed ashore, without an owner; applied also to things thrown out of a ship to lighten it in time of danger, known more distinctively as *jettison* (see **JET** 1: **JETTISON**): a third classification is *ligan*, goods sunken in the sea, but with a cork, bladder, or buoy attached for purposes of recovery.—In *law*, goods abandoned under such circumstances are termed *derelict* (q. v.); they may be saved by any person, and such person can recover for his services a varying proportion of their value.—See **SALVAGE**: **WRECK**.

FLOTILLA, n. *flō-til'lā* [Sp. *flotilla*; F. *flottille*, a squadron: dim. of Sp. *flota*; OF. *flote*, a fleet: Icel. *floti*, a raft, a fleet]: a fleet of small vessels.

FLOTOW, *flō'tō*, **FRIEDRICH**, Freiherr von: 1812, Apr. 27—1883, Jan. 24; b. Rentendorf in Mecklenburg: German operatic composer. He was intended for the diplomatic pro-

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fession; but turned to a musical career, and took lessons in composition from Reicha, in Paris. His earlier operas were refused by the managers of the Paris theatres; and his reputation was established first by his music to *Le Naufrage de la Méduse*, 1839. He composed many light operas including *Le Forestier* *L'Esclave de Camoëns*, *Alessandro Stradella*, *L'Ame en Peine*, *Martha*, *Rübezahl*, and *Zilda*, which attained popularity in France and in Germany, and are characterized by easy and lively dramatic action readiness of invention, pleasing melody, and graceful instrumentation. His reputation rests mainly on *Martha*, which remains a great favorite. Later works were *Indra* and *L'Ombre* (1869). F. was intendant of the theatre at Schwerin 1855-63, and died at Wiesbaden.

FLÖTZ, n. *flëts* [Ger. level]: in *geol.*, a term applied by Werner to the secondary strata of Lehmann, because in the district in which he examined them they were horizontal. But, as the horizontal position of the flötz was found to be a local accident, the term has been abandoned, giving place to secondary.

FLOUNCE, n. *flouns* [F. *francis*, a plait, a wrinkle: Dut. *fronsse*, a wrinkle]: a loose flap sewed outside the skirt of a lady's dress: V. to adorn with flounces. FLOUNCING, imp. *floun'sing*. FLOUNCED, pp. *flounst*.

FLOUNCE, v. *flouns* [Norw. *flunsa*, to do anything with noise and bluster: Sw. *flunsa*, to plunge in water: Dut. *flansen*, to do in a hasty, careless way]: *literally*, to be in a toss and fume with anger; to throw the limbs and body one way and the other: N. a sudden jerking or tossing motion of the body, indicating impatience. FLOUNCING, imp. FLOUNCED, pp. *flounst*.

FLOUNDER, v. *floun'der* [a nasalized form of Dut. *flodderen*, to make a flapping or fluttering motion, as loose garments: Ger. *flünder*, to flounder: comp. Sw. *fladdra*, to flutter]: to struggle, roll, or toss, as a horse in the mire. FLOUN'DERING, imp. rolling, tossing, and tumbling, as in mire. FLOUN'DERED, pp. *-dërd*.

FLOUNDER, n. *floun'dër* [Sw. *flundra*; Icel. *flydra*, a flounder—from the flapping motion of the fish (see FLOUNDER 1)], (*Platessa*): genus of fishes, of the Flat-fish family *Pleuronectidæ*, having one row of cutting teeth in each jaw, and generally pavement-like teeth on the pharynx; the dorsal and anal fins extending nearly the whole length of the body, the dorsal not coming farther forward than the centre of the upper eye; the tail-fin distinctly separated both from the dorsal and from the anal. To this genus belong the plaice, flounder, dab, etc. The species generally known as the F. (*P. Flesus*), is common on many shores. Its Swedish name is *Flundra*. Its Scottish name is *Fleuk*, or *Fluke*, a name which, with additions, is extended to many other kinds of flat-fish. The F. is often a foot or more in length. Its greatest breadth, without the fins, is about one-third of the whole length, rather less than that of the plaice. It is easily distinguished from the plaice by a row of small tubercles on each side of the lateral line.

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The color varies according to the ground from which the fish is taken. The F. is found chiefly in rather shallow water, with sandy or muddy bottom, and equally in the most salt water and in the brackish water of estuaries. It ascends still rivers into perfectly fresh water, and may be kept in fresh-water ponds. It lives long out of water, and is easily transferred to ponds.—The F., like the other fishes of this genus, generally swims on the left side, and has the eyes on the right side; but reversed specimens are frequent.

FLOUR, n. *flōw'r* [F. *fleur*, flower, blossom; *fleur de farine*, blossom of meal, flour]: the fine sifted part of ground wheat or other pulverized grain (see BREAD: MILL). FLOU'RING, n. the business of converting grain into flour. FLOURY, n. *flōw'ri*, resembling flour. NEW PROCESS FLOUR, flour made by gradually crushing the grain between sets of revolving rollers. Experiments with this method, which had been in use in France and Hungary, were made at Minneapolis, about ten years ago. In 1880 many mills adopted the system and it is now used in the largest and best equipped flouring establishments in the country. The rollers are arranged in pairs, with spiral grooves of various degrees of depth and fineness, and revolve toward each other. Grain passing between the rollers, the grooves of which cross at an angle, is gradually crushed, thus making possible a nearly complete separation of the nutritive from the waste portions. After bolting, the middlings are passed between smoother rolls and a nutritive grade of flour is obtained. SELF-RAISING FLOUR, flour prepared by the addition to ordinary flour of a suitable quantity of substances which combined and moistened have the efficiency of yeast, but which remain inert while dry. Thus the delay attending the action of yeast is avoided. The development of carbonic acid gas, which makes the bread light, is secured by the action of an acid upon bicarbonate of soda or a similar alkali. The materials, forming a neutral compound, are intimately mixed with each other and with the flour. By merely adding water the flour is made ready for baking. The original process of preparing the flour, developed in England, was to mix flour and tartaric acid in suitable proportions, and with another quantity of flour mix bicarbonate of soda. When these two lots were thoroughly mixed with each other the flour was ready for sale. In this country acid phosphate of lime, in a finely pulverized form, is used to some extent in place of tartaric acid or cream tartar, which are largely employed. It is said to be equally efficient and to supply to the flour nutritive matters which have been removed in the bran. Under the name of baking powders the materials used in self-raising flour can be obtained and added to the flour at the time of baking. Baking-powders containing deleterious substances should be avoided.

FLOUR, St., *flōr*: a small town of France, dept. of Cantal, finely situated on a steep basaltic plateau at an elevation of 3,000 ft. 34 m. e.n e. of Aurillac. It is built entirely of lava and basalt. Its streets are narrow, and its houses in

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general have a miserable, dark, and dirty appearance. The principal building is the cathedral. A suburb lies at the foot of the rock, and communicates with the town by a winding road cut in the rock. F. has manufactures of hollow ironware, cloth, and table-linen. Pop. 5,000.

FLOURENS, *flô-rông*, MARIE JEAN PIERRE: 1794-1867, Dec. 6; b. at Maureilhan, Hérault: physiologist. After having obtained his degree M.D. at Montpellier, at the early age of 19, he went to Paris, where he soon became acquainted with the Cuviers, Geoffroy St. Hilaire, and other eminent naturalists. For more than 40 years, F. was a voluminous writer on human and comparative anatomy and physiology, on natural history, and on various special departments of the sciences. Among his most important works are: *Recherches Expérimentales sur les Propriétés et les Fonctions du Système Nerveux dans les Animaux Vertèbres* (1824); with a supplementary vol. *Expériences sur le Système Nerveux* (1825); *Recherches sur le Développement des Os et des Dents* (1842); *Anatomie Générale de la Peau et des Membranes Muqueuses* (1843) tending to demonstrate the unity of the human race, by showing that there are no essential differences between the structure of the skin in the negro and the European; *Théorie Expérimentale de la Formation des Os* (1847), perhaps the most celebrated of his works. Among his smaller and popular works, are: *Analyse Raisonnée des Travaux de Georges Cuvier* (1841); *Buffon, Histoire de ses Idées et de ses Travaux* (1844); *De l'Instinct et de l'Intelligence des Animaux* (1841); *Examen de la Phrénologie* (1842); *Histoire de la Découverte de la Circulation du Sang* (1854); *De la Longévité Humaine, et de la Quantité de Vie sur le Globe* (1854); and his *Eloges Historiques*, a beautifully written series of scientific biographies.—As early as 1821, F. delivered a course of lectures on 'The Physiological Theory of Sensations,' and presented some of his first scientific contributions to the Acad. of Sciences, into which body he was admitted 1828. About this date, he was appointed assistant to Cuvier, and 1832 he succeeded to the full duties of prof. of natural history in the Jardin du Roi. In 1833, he succeeded Dulong as perpetual sec. of the Acad. of Sciences and 1840 the French Acad. elected him a member. He was made a peer of France by Louis Philippe 1846, and was appointed prof. in the Collège de France 1855. He died at Montgeron, near Paris.

FLOURISH, v. *flŭr'ish* [L. *flōres'cēre*, to begin to bloom—from *flos*, a flower: F. *fleurir*, to blossom; *fleurissant*, flourishing]: *literally*, to come out in blossom; to thrive; to prosper; to adorn with flowers; to wave or brandish; to embellish or adorn: N. blossom; showy splendor; parade of words; a sounding, as of trumpets; a bold stroke in writing; in *OE.*, beauty; bravery. FLOUR'ISHING, imp.: ADJ. thriving; prosperous; making a show. FLOUR'ISHED, pp. *-isht*. FLOUR'ISHINGLY, ad. *-ly*.—SYN. of 'flourish, v.': to vaunt; boast; adorn; ornament; embellish; swing; brandish.

FLOUT, v. *flout* [Dut. *fluyten*, to whistle, to flatter:

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Scot. *flyte*, to scold]: to mock; to treat with contempt; to jeer: N. a mock; an insult. FLOUT'ING, imp. FLOUT'ED, pp. FLOUT'INGLY, ad. -lī.

FLOW, v. *flō* [AS. *flowan*; Dut. *vloeden*, to flow: L. *fluere*, to flow—allied to FLEET and FLOOD, which see]: to move along, as water; to run, as a liquid; to rise, as the tide; to issue, as from a source; to glide along smoothly; to hang loose and waving, as a mantle: N. rise of water, as opposed to a *fall*; a stream; copiousness, as a flow of language; sudden plenty or abundance. FLOW'ING, imp.: ADJ. running, as water; fluent or smooth: N. act of running, as water; great rise or abundance, as of water. FLOWED, pp. *flōd*. FLOW'INGLY, ad. -lī. FLOW'AGE, n. -āj, act of flowing; an overflowing with water; the water which has overflowed. — SYN. of 'flow, v.': to move; change; melt; glide; proceed; abound; rise; inundate; flood; cover; arise; spring; emanate.

FLOWER, n. *flow'r* [OF. *flour*; F. *fleur*—from L. *flōrem*, flower, blossom]: blossom; the bloom of a plant; the best or finest part of a thing, as flower of age, an army, etc.: V. to blossom or bloom; to adorn with flowers. FLOWERING, imp. *flow'ér-ing*: ADJ. blossoming; blooming: N. act of blossoming; the season when plants blossom; act of adorning with flowers. FLOWERLESS, a. *flow'ér-lēs*, destitute of flowers. FLOWERS, n. plu *flow'rz*, in *chemistry*, name formerly used for fine mealy matter, as *flowers of sulphur*, of *antimony*, of *arsenic*, etc.; the term was given originally by the alchemists to the sublimate which rose, or appeared to grow, from certain bodies capable of volatilization when subjected to heat. FLOWERED, pp. *flow'rd*: ADJ. embellished with figures or flowers. FLOWERY, a. *flow'ér-ī*, full of or adorned with flowers; ornate, as applied to language. FLOW'ERINESS, n. FLOWERET, n. *flow'ér-ēt*, a little flower. FLOWER-DE-LUCE, n. *flow'r-dē-lōs'* [F. *fleur-de-lis*, flower of the lily]: the iris; corn-flag; an heraldic device representing a lily: see IRIS: FLEUR-DE-LIS (emblem). FLOWER-GARDEN: see FLORICULTURE.

FLOW'ER, or BLOS'sOM: that part of a phanerogamous plant in which the organs of reproduction (*stamens* and *pistils*) are situated, and which consists essentially of a single group of these, generally surrounded by *floral envelopes* (the *calyx* and *corolla*). Both the organs of reproduction and the floral envelopes are metamorphosed leaves, and arise in successive whorls from a much shortened axis, called the *thalamus* (Gr., a nuptial-bed), or *torus* (Lat., a couch). Flowers are sometimes closely attached to the stem or branch from which they grow, and are then said to be *sessile* (Lat., sitting); but sometimes there intervenes a *flower-stalk* or *peduncle*, either simple or branched. The whole assemblage of flowers of a plant is called its *Inflorescence* (q.v.), and the different kinds of inflorescence, or modes in which the flowers are produced and grouped, are often as characteristic as the diversities in the flowers themselves, though the latter are in general more important with reference to botanical affinities.

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In the large nat. ord. *Compositæ*, many small flowers are congregated on a common *receptacle*, and surrounded with *bracts* in the form of an *involucre*, as a single flower is surrounded by its calyx. The *head of flowers* is in this case popularly called a flower; and the individual flowers of which it is composed are by botanists styled *florets*. This term is applied also to the individual flowers in the *spikelets* of the grasses (q.v.), of which the *glumes* are a common involucre.

The order of the whorls in flowers is invariable: the Calyx (q.v.) is always exterior to the Corolla (q.v.); within the corolla are the *Stamens* (q.v.), or male organs of reproduction, and in the centre of all is the *Pistil* (q.v.), the female organ of reproduction. An outer calyx, or whorl of metamorphosed leaves, exterior to the calyx, and usually smaller, is found in some flowers, as mallows, and is called the *epicalyx*. Within the corolla, there is sometimes an additional or supplementary corolla, called the *Corona* (q.v.)

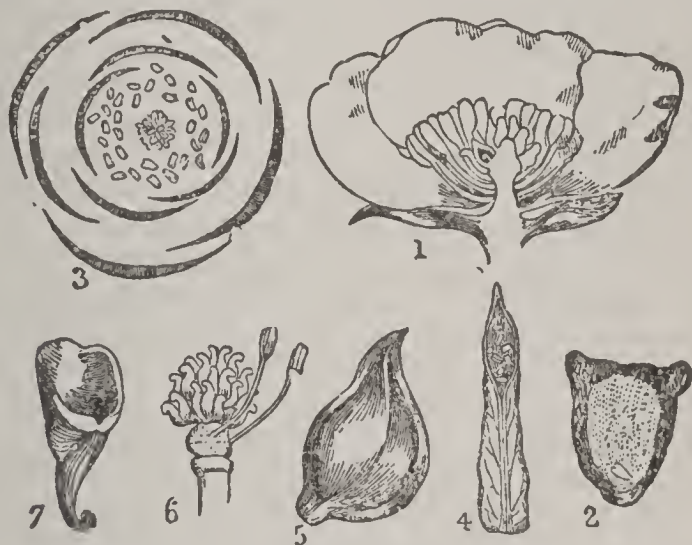


Illustration of some of the Principal Parts of a Flower (from Balfour's *Botany*):

- 1, Section of the flower of *Ranunculus*, showing sepals, petals, numerous stamens, with adnate anthers, placed below the carpels,
- 2, Anatropal seed of *Aconite*, cut vertically, showing abundant homogeneous albumen and a small embryo.
- 3, Diagram of the flower of *Ranunculus*, with five sepals, five petals, numerous stamens, and carpels.
- 4, Ripe follicle of *Columbine*.
- 5, Ripe achene of *Ranunculus*.
- 6, Numerous single-seeded carpels of *Ranunculus*.
- 7, Spurred petal of *Columbine*.

coronet, or *crown*. When the calyx and corolla are not easily distinguishable, the term *Perianth* (q.v.), or *perigone*, is employed, as in the lily, crocus, iris, and the greater number of endogenous plants, although even in these there are really two whorls closely united. In some flowers, there are several whorls of leaves forming one or each of the floral envelopes; and in like manner, some have several whorls of stamens, and sometimes there are several whorls of the carpels which form the pistil. In some flowers, certain whorls are entirely wanting; thus, not a few exogenous plants are destitute of the corolla, which is sometimes the case with plants—exceptional *apetalous* species—very

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nearly allied to others that have it. It is by a similar abortion of a whorl that flowers become unisexual. Both stamens and pistils are generally present in the same flower, which is called a *hermaphrodite* or *perfect* flower; but many flowers contain only the male organs of reproduction, and many contain only the female organs, and such flowers are described as *unisexual*, *diclinous* (q.v.), or *imperfect*, and respectively, as *male* or *staminiferous*, and *female* or *pistilliferous* flowers. Male flowers are called also *barren* or *sterile*, and female flowers *fertile*, though their fertility depends on the communication of pollen from the staminiferous flowers. When both male and female flowers are produced on one plant, the specie is said to be *monœcious* (Gr., having one house); but when they are on separate plants, it is *diœcious* (Gr., having two houses). Those which produce male, female, and hermaphrodite flowers are called *polygamous*. Sometimes both stamens and pistils are wanting, and the flower is then said to be *neuter* or *empty*, as in the case of the florets of the ray in many composite flowers. Sometimes, on the contrary, both calyx and corolla are wanting; and then the flower is said to be *naked*, or *achlamydeous* (Gr., without covering), as flowers having only one floral envelope are called *monochlamydeous*, and flowers having both calyx and corolla are called *dichlamydeous*. Achlamydeous flowers are often grouped in some peculiar manner, and protected by bracts or by a spathe.

Flowers are always regular in their rudimental state—whorls of elevated points or *papillæ*; some of these, however, are frequently abortive, while more frequently some acquire greater development than others of the same whorl, making the whorl and the flower *irregular*; and greater varieties of form are common in the metamorphosed leaves which compose the flower, than in true leaves themselves. The *internodes*, or portions of the axis between the whorls, are sometimes also peculiarly developed into *Disk* (q.v.), *Gynophore*, etc. The different whorls often differ in their *Æstivation* (q.v.). But a beautiful symmetry may generally be traced in the arrangement of the parts of flowers, the whorls consisting of the same number of parts, and the parts of each whorl being opposite to the spaces of the whorl exterior to it; and this symmetrical plan remains manifest; even when there is abortion or extraordinary development of particular parts. The number of parts in the pistil is, however, often smaller than in the exterior whorls; and sometimes particular parts appear to be divided, and so apparently multiplied, as the long stamens of the *Cruciferae* each pair of which is to be regarded as one stamen split into two, and has its place accordingly among the parts of the flower. The symmetry of flowers is illustrated by the diagrams on the next page.

The development of flowers in most cases follows the complete formation of the stem-leaves; more rarely precedes or accompanies it. The unfolding of the parts of a flower is called its *flowering* or *blossoming*, and, when their functions are performed, it fades; the floral envelopes, the stamens, and even the styles, sometimes falling off early, and some

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of them sometimes remaining in a withered state until the ripening of the fruit; the calyx frequently undergoing such modifications as to convert it into a part of the fruit itself.—In the greater number of plants, flowering takes place, during the flowering season, indiscriminately at all hours of the day; and the flowers, once opened, remain open, even during night, till they fade. In many plants, however, a *sleep of flowers* takes place; they open and close with the returns of day and night. Thus, *sunflowers* open in the morning, and close at evening; while there are other flowers which open in the evening, and close at morning. Others open and close at certain hours of the day; thus, the flowers of the common purslane open about 11 A.M., and

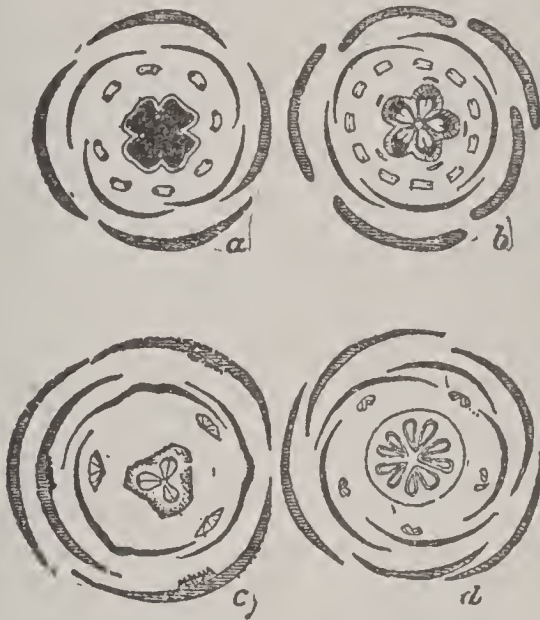


Illustration of the Symmetry of Flowers (from Ralfour's *Botany*):

a, Diagram of the flower of Heath (*Erica*), having four sepals, four divisions of the corolla, eight stamens in two rows, and four divisions of the pistil. The flower is tetramerous, complete, symmetrical, and regular. *b*, Diagrammatic section of a symmetrical pentamerous flower of Stone-crop (*Sedum*), consisting of five sepals externally, five petals alternating with the sepals, ten stamens in two rows, and five carpels containing seeds. The lines on the outside of the carpels are glands. *c*, Diagram of the trimerous symmetrical flower of Iris. There are three alternating divisions of each whorl. *d*, Diagram of the flower of Flax (*Linum*), consisting of five sepals, five petals, five stamens, and five carpels, each of which is partially divided into two. It is pentamerous, complete, symmetrical, and regular.

close soon after midday; *Anthericum pomeridianum* opens its flowers about 2 P. M., and closes them before night; the large fragrant blossoms of *Cereus grandiflorus* open between 7 and 8 P.M., and its sleep commences soon after midnight. In a few plants, the sleeping and waking of the flowers are regulated by the conditions of the weather. The waking and sleeping of flowers either continues for several days in succession, as in some species of *Mesembryanthemum*; or the brief life of the flower ends when it first sleeps, as in the Tiger-flower.

The odors of flowers, extremely various, often delightful, sometimes very offensive, are in some cases equally

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powerful as long as the flower is open; in others, they vary in strength at different times of the day. Some flowers, as those of *Hesperis tristis* and *Pelargonium triste*, though remaining open during the day, diffuse their fragrance only when night comes on. The Oriental Hyacinth, commonly cultivated in windows, is at all times perceptibly fragrant, but fills the apartment with its perfume about eleven o'clock at night.—The colors of the different parts of flowers generally remain unchanged, but sometimes undergo changes during the life of the flower. The flowers of *Myosotis versicolor*—a small species of Forget-me-not, very common as a weed in gardens—are sulphur-yellow when they first open, and afterward change to blue. The petals of *Cheiranthus mutabilis*, when they first expand, are yellow, and afterward pass to orange, red, and finally purple. In *Hydrangea hortensis*, familiar as a window-plant, the flowers are at first green, then rose-color, purplish red intermixed with green, and finally when about to fade, of a sickly green. Some flowers undergo remarkable changes of color during the day, as those of the common pink *Phlox*, which, early in the morning, are light blue, and become bright pink as the day advances; and those of *Hibiscus variabilis*, white in the morning, pink at noon, and bright red at sunset. The colors and odors of flowers are subjects in the investigation of which physiologists have not yet been able to go far. The chemical products on which they immediately depend are partially known; but how the chemical changes are wrought, and what various purposes they all serve as to the plant itself, have not even begun to be ascertained. Both colors and odors are due more or less to the action of the sun's rays. They are also sometimes modified by soil; and diversities of color have been obtained in cultivated flowers by changing the soil in which they grow.—A few flowers are edible, though none are of importance on this account. Some, or parts of them, are used in dyeing; but, notwithstanding the beauty and variety of the colors of flowers, a very small proportion of vegetables dye-stuffs is obtained from them; and a similar remark is applicable to their medicinal use. For dyeing and painting, the colors of flowers can seldom be obtained in considerable quantity, except at too great expense, and seldom of brilliancy at all corresponding with that which they exhibit in the flower itself. They are also in general fixed with great difficulty, some yellow colors being the only notable exceptions.

Flowers, being subservient to the reproduction of the species, are in all not unfavorable circumstances, followed by fruit (q. v.). This, of course, in monœcious and diœcious plants, is the case only with the female flowers, the male flowers soon withering away when they have dispersed their pollen: see FECUNDATION: STAMEN. But even after the fecundation of the ovules, and when, in the language of gardeners, the fruit is *set*, unfavorable circumstances, such as excessive heat or cold, drought or moisture, lack of due nutriment to the plant, or to the individual fruit itself, through excess in the number of

FLOWER—FLOWERS.

fruits set at once—often cause it to fall off early, long before it has attained its full size: see FRUIT.

FLOWER, ROSWELL PETTIBONE: banker: b. Theresa, Jefferson co., N. Y., 1835, Aug. 7. He received a common-school education, engaged in mercantile and manufacturing pursuits, became attorney of his sister, widow of Henry Keep, and had the management of the Keep estate, valued at over \$4,000,000, removed to New York 1869, and established a banking-house. In 1880, he was elected member of congress as a democrat; re-elected, 1888. 1890; 1885 was tendered and declined the nomination for lieutenant-gov. of N. Y., 1886 was appointed by Gov. Hill a commissioner of electric subways of New York. He was wealthy and liberal, built St. Thomas's Home of New York, at a cost of \$50,000, and a Presb. church in his native town, and gave a tenth of his income to church and charitable institutions. He was elected governor of New York 1891. D. 1899.

FLOWER-POTS: small receptacles, filled with soil, for growing plants; made usually of burnt clay, unglazed, tapering a little toward the bottom, and having the bottom perforated with one or more holes. Those of smallest size (*thumb-pots*) are only about two inches deep, and are chiefly for seedlings soon to be transplanted. For plants which require a pot more than 12 inches deep and 18 inches wide, wooden boxes or tubs are generally used. The flower-pot is usually placed in a saucer of the same material when used in apartments or on the shelves of a green-house; but when plants growing in flower-pots are placed in the garden, the saucer is dispensed with. For ornamental use, flower-pots are sometimes glazed, or made in the shape of vases, etc.—In filling flower-pots, small stones or bits of broken pottery are placed in the bottom, to prevent water from lodging there and *souring* the soil in which the plant is to grow. The roots of plants growing in pots are generally examined once or twice a year, by turning them out of the pot, with the whole ball of earth attached, when the roots, which have often become matted round the outside of the ball of earth, are pruned, and the plant is either restored to the same pot or transferred to a larger one. The change of soil made at this time is, according to circumstances, either complete or partial.

FLOWERS, ARTIFICIAL: branch of manufacture, intermediate between the fine and the mechanical arts. The Italians were the first to bring it to a high state, and it is now far advanced in France, England, and the United States. The value of artificial flowers annually exported from France exceeds \$200,000.

The materials used are various. Feathers have long been used by the American Indians. In Italy, the cocoons of silk-worms are dyed and extensively used. Beautiful imitations of flowers are made from shells, either in their natural colors or tinted. Paper, ribbons, velvet, thin laminæ of whalebone, etc., also are used. The materials of which A. F. commonly in use are made, are French cam-

FLOWERS.

oric, Scotch cambric, jaconet, and fine calico, besides muslin, crape, and gauze for particular flowers, and satin and velvet for thick petals, etc. Wax-flower making is a distinct branch, and those who follow it claim the title of artist: see WAX FLOWERS.—The petals and sepals of the flowers, as well as the leaves of the plant, are stamped out by punches, or 'irons,' as they are technically termed. A large stock of these irons is necessary, as special forms and sizes are required for each flower. The next process in shaping is that of 'goffering,' or 'gauffering,' by which the hollow form is given to petals, and the mid-rib and veins of leaves imitated. For hollowing petals, the goffering-iron is simply a polished iron ball mounted on an iron wire in a handle. It is slightly warmed, and the petal is placed on a cushion, and the iron pressed against it. A variety of other forms of goffering-irons are used, such as prismatic rods, bent wires, etc. The venation of leaves is effected by dies, made of iron or copper, which are nevertheless called goffering-irons.—The tinting of petals of the best flowers requires some delicacy and skill. In nature, however, the tint of each petal of a flower is rarely uniform; and the best artificial flowers represent the natural variations with great accuracy. The petals of a rose, for example, are dyed by holding each separately by pincers, and then dipping it in a bath of carmine, and afterward into pure water, to give delicacy of tint; but as the color is usually deepest in the centre, a little more dye is added there while the petal is still moist, and this diffuses itself outward in diminishing intensity. The whiteness at the insertion of the petal is produced by touching that part with pure water after the rest is dyed.

Leaves are cut and stamped in like manner from green taffeta, cambric, calico, etc. The glossy upper surface is represented by coating, with gum-arabic, the taffeta, etc., from which they are stamped, and the soft tone of the under side is obtained by means of starch colored to the requisite shade and brushed on when of the right consistence to dry with the proper effect. A velvety texture is given by dusting the powdered nap of cloth, which has been previously dyed of the required color, over the gummed leaf, the gum having been allowed to partly dry till it has become 'tacky.' The superfluous portion of nap is then shaken off. Buds are made of taffeta, tinted, and stiffened, and stuffed with cotton. Stamens are made of short pieces of sewing-silk stiffened with gelatine, and, when dry, the ends are moistened with gum and dipped in flour colored yellow to represent the pollen. Fine wire is sometimes used for the filament of the stamen.—The flower is built up from the centre; the pistil and stamens are tied in a bunch to a piece of wire; the petals are arranged in order, and pasted; then the sepals of the calyx are pasted outside of these, and further secured by winding fine thread or silk round the lower parts. Other wires are inclosed with this thread, and form the stalk, which is bound round with green tissue-paper; and, at proper intervals the leaves are inserted by means of fine

FLOWN—FLOYD.

wires, to which they are bound, the ends of these wires being bound in and incorporated with the stalk, and concealed by the green paper.

Besides the flowers copied from nature, there is a considerable demand for what are called 'fancy flowers,' most of which are invented by the manufacturer to use up waste and spoiled fragments originally designed for better purposes.—Flowers suitable for mourning are prepared by coating leaves, flowers, etc., with strong gum, and then dusting upon them powdered galena. This substance, a sulphuret of lead, is formed naturally in lustrous cubic crystals of a dark gray color, and, however finely it is powdered, the fragments still tend to retain the same shape and surface, and thus present a number of flat, glittering faces. It is used in like manner for cheap jewelry.

FLOWN, v. *flōn*: pp. of FLY, which see.

FLOX ÆRIS, *flōks ē'ris*: term applied to the suboxide or red oxide of copper.

FLOYD, JOHN BUCHANAN: 1807, June 1—1863, Aug. 26; b. Blacksburg, Va.: lawyer. He graduated at the College of S. C. 1826, studied law and was admitted to the bar, practiced in Helena, Ark. 1836-40, and then settled in Washington co., Va. He was a member of congress 1847-49, gov. of Va. 1850-53, and was sec. of war in Pres. Buchanan's cabinet from 1857, Mar., till the autumn of 1860, when he resigned. In 1861, he was indicted on charges of having scattered the army in remote parts of the country, having filled southern arsenals with arms and ammunition, and having been privy to the theft of \$870,000 in govt. bonds from the interior department. He returned to Washington, demanded a trial, and was exonerated from each charge on investigation by a committee of the house of representatives. Soon afterward he was appointed brig.gen. in the Confederate army, served in Va. and Ky., and while senior officer at Fort Donelson abdicated his command, escaped with Gen. Pillow and 5,000 men at night, and threw the responsibility of surrendering to Gen. Grant upon Gen. S. B. Buckner. Two weeks afterward he was relieved from command by Pres. Davis.

FLOYD, WILLIAM: 1734, Dec. 17—1821, Aug. 4; b. Brookhaven, N. Y.: signer of the Declaration of Independence. He was a farmer in early life, was delegate to the congress at Philadelphia 1774, deputy to the N. Y. provincial convention to select delegates to the continental congress and member of that body 1775, served in each congress till 1783, was state senator 1777-83 by appointment, and 1784-88 by election, was again member of congress 1789-91, was presidential elector 1792, 1800, 04, 20, and after the revolutionary war was maj.gen. of militia on Long Island.

FLUCTUATE—FLUFF.

FLUCTUATE, *v.* *flŭk'tŭ-āt* [L. *fluctŭātŭs*, moved like a wave—from *fluctus*, a wave: It. *fluttuare*; F. *flotter*, to float]: to move, as a wave; to move, now in one direction, then in another; to be irresolute or wavering; to rise and fall, as prices. **FLUC'TUATING**, *imp.*: **ADJ.** unsteady; wavering; changeable. **FLUC TUATED**, *pp.* **FLUC'TUA'TION**, *n.* *-ā'shŭn* [F.—L.]: a moving in this and that direction; a rising and falling suddenly.—**SYN.** of 'fluctuate': to waver; scruple; hesitate; vacillate; demur.

FLUDD, *flŭd*, **ROBERT**: 1574–1637; b. England: physician, best known as a mystical writer. After studying at Oxford, he became a devout student of the works of Paracelsus (q.v.). In numerous volumes he expounded a system of his own, in which a parallel was drawn between man the microcosm, and the universe around him, the macrocosm. The main physical principles were a northern or condensing power, and a southern or rarefying one; and there were four elemental spirits, corresponding to air, earth, water, and fire. So little established was physical science in that day, that this absurd system called forth refutations from men like Kepler. See De Quincey's works, vol. xvi.

FLUE, *n.* *flō* [OF. *flue*, a flowing: F. *fluer*, to flow: OF. *fleute*, a flute, a pipe—from L. *fluĕrĕ*, to flow]: a small chimney leading into a larger; a passage for conveying smoke and flame from a fire; a tube or shaft for conveying hot air, etc.: see **CHIMNEY**.

FLUE, *n.* *flō*, or **FLUFF**, *n.* *flŭf* [W. *pluf*, feathers: Bav. *flawen*, light dust that settles on clothes: Ger. *flaum*, down]: nap or down; little feathers or flocks that stick to clothes. **FLUF'FY**, *a.* *-f'ŷ*, pertaining to nap; soft and downy.

FLUENT, *a.* *flō'ĕnt* [L. *fluĕn'tem*, flowing—from *fluō*, I flow: It. *fluente*]: flowing smoothly; ready in speech; voluble. **FLU'ENCY**, *n.* *-ĕn-s'ŷ*, readiness of utterance; smoothness. **FLU'ENTLY**, *ad.* *-l'ŷ*, with ready flow. **FLUENTS AND FLUXIONS**, in *math.*: see **FLUXIONS**.

FLUFF, *n.* *flŭf* [Dan. *fnug*, down: AS. *flugol*, a fugitive (see **FLUE** 2)]: nap or light dust; feathery particles that float in the air; nap or down. **FLUFFY**, *a.* *flŭf'f'ŷ*, resembling fluff or nap; soft and downy. **FLUFFIER**, *comp.* *flŭf'f'ŷ-ĕr*. **FLUF'FIEST**, *superl.*

FLUGELMAN--FLUKE.

FLUGELMAN, n. *flō'gl-măn* [Ger. *flügelmann*, file-leader—from *flügel*, a wing, *mann*, a man]: a soldier who stands on the right or in the front of a body of men, and whose motions in the manual exercises they simultaneously follow: also spelled **FUGLEMAN**, n. *fū'gl-măn*.

FLUGGEA, n. *flüg'gè a* [named by Willidenow after John *Flügge*, a German cryptogamic botanist]: a genus of *Euphorbiaceæ*. The bark of *F. virosus* intoxicates fish. The berries of *F. leucopyrus*, an Indian, and *F. abyssinica*, an Abyssinian species, are eaten by the natives.

FLUID, n. *flŭ'id* [*F. fluide*—from L. *fluidus*, flowing—from *fluō*, I flow: It. *fluido*]: a liquid or a gas: anything that flows like water. The mathematical definition of a fluid is, that it is a collection of material particles which can be moved among each other by an indefinitely small force. No fluid in nature strictly fulfils this definition, though very many do so sufficiently nearly to make the conclusions founded on the definition practically correct. Fluids are distinguished into *Elastic* and *Inelastic*—the former being those the volume of which is diminished by pressure, and increases when pressure is removed, e.g., vapors and gases; the latter being those which have not this property, e.g., water and all those fluids termed Liquids (q.v.). Elastic fluids are spoken of also as compressible; and inelastic as incompressible—which, strictly speaking, no known fluid is, though all ordinary liquids are sufficiently nearly so to be so regarded without sensible error. See VAPOR: ELASTICITY: HEAT: COHESION: CAPILLARY ACTION. **FLUID**, a. movable or flowing, as water or air. **FLUID'ITY**, n. -*īd'ī-tĭ*. or **FLU'IDNESS**, n. [*F. fluidité*]: the state in which bodies tend to flow, or are capable of flowing; a liquid state. **ELASTIC FLUIDS**, vapors and gases. **NON-ELASTIC FLUIDS**, ordinary liquids.

FLUKAN, n.: see under **FLOOKEN**.

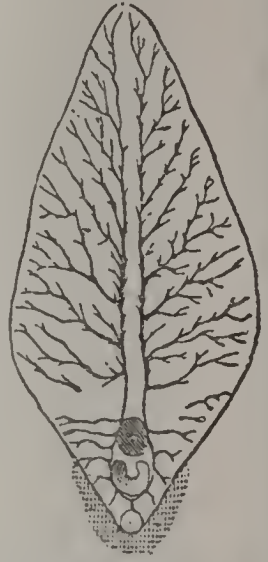
FLUKE, n. *flōk* [Ger. *flug*, a plow (see **FLOOK**)]: the broad part of the arm of the anchor (q.v.), whose pointed triangular termination fastens in the ground.

FLUKE, v. *flōk* [probably originating as a slang term at billiards (see **FLUKE 3**)]: to play for one thing and get another; to come in for an unexpected stroke of luck; to succeed unexpectedly and undeservedly: N. a haphazard; a mere chance; a stroke of good luck; an unexpected advantage. **FLUK'ING**, imp. **FLUKED**, pp. *flōkt*.

FLUKE, n. *flōk* [AS. *floc*, a fluke: Icel. *floki*, a kind of halibut]: a fish called a flounder. **FLUKE**, or **FLUKE-WORM** (*Distoma hepaticum*), an entozoon common in the liver and biliary ducts of ruminants, particularly of sheep, in which it produces the disease called *Rot*, often causing great mortality in flocks during wet seasons and on ill-drained lands. It receives its common name from its resemblance in form to the flounder, of which *fluke* is a Scotch and old English name. For a similar reason, it is sometimes called *Plaice*. It is a Trematode (q.v.) worm, higher in organization than the cestoid worms, but not so high as the *Cæelmintha*. It is generally not quite an inch in length,

FLUKE.

often much less, sometimes more; of oval form, its breadth about half its length; flat, in color not very different from the liver in which it exists; it has no eyes nor other known organs of special sense; it is hermaphrodite, and the organs of reproduction occupy great part of its body, the ovaries being ranged along the margin; its anterior extremity is furnished with a sucker, and another is situated at a small distance on the ventral surface, whence the named *Distoma* (Gr., two-mouthed), but the terminal sucker alone is perforated and serves as a mouth, by which bile—the food of the creature—is imbibed; the tube which proceeds from it not, however, becoming a proper intestinal canal, but soon dividing into two large branches, and ending in minute ramifications in all parts of the body. Prodigious numbers of flukes of different sizes are sometimes found in the liver of a single sheep, but they are now believed



Fluke-worm (*Distoma hepaticum*).

not to multiply there, as was formerly supposed. Their eggs, indeed, are produced there in great quantity, but find their way into the outer world to begin a series of transformations not yet accurately traced with regard to this particular species, but of which the general nature is known: see CERCARIA: TREMATODE WORMS: GENERATIONS, ALTERNATION OF. It seems that the young flukes, having entered as *Cercaria* into the bodies of mollusks or of aquatic insect larvæ, are conveyed into the stomachs of ruminants feeding on herbage to which these are attached, and, finding their way to the liver, there attain their full development. See ROT: see also *Nature*, 1882, p. 606.

Instances have occurred of the presence of *Distoma hepaticum* in the human liver and *vena portæ*; as well as of a similar species, *D. lanceolatum*; a small species of the same genus, *D. heterophyes*, has been found in great numbers in the human intestines in Egypt, but its influence on the system is unknown; a species of much elongated form, *D. hæmatobium*, is very common in Egypt, infesting the *vena portæ* of man, and the walls of the urinary bladder, and producing local, and afterward general disease; a small species, *D. ophthalmobium*, has been found in the human eye, but probably through some such accident as in another case has led to the occurrence of the common fluke under the skin of the foot, where it caused a sore. Of all the known species, the Egyptian, *D. hæmatobium*, is by far the most hurtful, as infesting the human body. This species is also remarkably different from the others, in not being hermaphrodite, and in the extreme dissimilarity of the male and female; the female being a thread-like worm, for which a lodgment is provided in a furrow (*gynæcophorus*) on the ventral surface of the male. It is frequently known as *Bilharzia*.—The genus *Distoma*, or Fluke, contains a great number of species, infesting, in their mature state, different

FLUME—FLUOR.

kinds of animals, and finding their appropriate place in very different parts of the animal frame. The wrinkled membrane around the eyes of birds is the place of some.

FLUME, n. *flóm* [Norw. *flaum*, a flood: OF. and AS. *flum*; L. *flūmēn*, a river]: a stream of water in a confined channel to drive a mill; an artificial stream of water in gold-washing: applied also to similar streams of water flowing naturally between rocky walls, notable among which is The Flume in the Franconian Mountains, N. H., 16 m. from Littleton: its impressiveness is heightened by a cascade.

FLUMMERY, n. *flūm'mér-ī* [W. *Uymru*, an acid preparation from the husks and fragments of oats; or Ger. *pflaumerei*--from *pflaum*, a plum]: a kind of food made from the husks of oats steeped in water, called in Scotland *sowens*; a light kind of food; empty compliment; mere flattery.

FLUNG: pt. and pp. of the verb **FLING**.

FLUNK, n. *flŭngk* [colloq.—etym. doubtful]: a lazy lounging fellow; a failure in or backing out of any undertaking. V. to fail, as in a lesson; to retire through fear; to back out.

FLUNKY, or **FLUNKEY**, n. *flŭng'kī* [Low Ger. *flunkern*, to be gaudily dressed: Dut. *flonkeren*, to glitter]: a servant in livery, generally a term of contempt; one who is obsequious and cringing to people of rank, and a servile imitator of their manners; an upstart; a low mean-spirited fellow.

FLUN'KYISM, n. *-kī-izm*, the character or quality of a flunky. **FLUN'KYDOM**, n. the place or domain of flunkies. *Note*—Skeat says **FLUNKY** is derived from F. *flanquer*, to flank—as being one who supports, or is at one's elbow for help at need; a henchman.

FLUO-, prefix *flō-ō-*: having fluorine in its composition.

FLUOHYDRIC ACID, or **HYDROFLUORIC ACID**: see **FLUORINE**.

FLUOR, n. *flŭ'ŏr* [F. *fluor*, fluorine—from L. *flŭō*, I flow; *flŭŏr*, a flowing—so called from being used as a flux]: mineral called usually **FLUOR SPAR**, often described chemically as Calcium Fluoride, a compound of fluoric (hydrofluoric) acid and lime; but which is in reality *Fluoride of Calcium* (CaF_2), consisting of 48.14 fluorine and 51.86 calcium (the base of lime). It occurs both crystallized and massive: the massive varieties exhibiting a crystalline structure; the crystals usually in groups, sometimes of the primary form, which is a cube, but often of secondary forms of which there is great variety, as the octahedron, rhombic dodecahedron, etc. F. spar is sometimes colorless, but often green, blue, yellow, or red, more rarely gray, or even black; different shades of color frequently appearing in the same specimen, and, in the massive varieties, beautifully intermixed. Its colors often rival those of the most beautiful gems; but it is of inferior hardness, being scratched even by quartz. Its specific gravity is 3.14. It generally becomes phosphorescent when heated, though this is more remarkably the case with some varieties than with others;

FLUORINE.

it is decomposed by heated sulphuric acid, with evolution of hydrofluoric acid as a pungent gas, which, having the property of acting upon and corroding glass, F. spar is used with sulphuric acid for etching on glass. F. spar is used also for ornamental purposes, being wrought into vases, etc., for which it was in high esteem among the ancients. But the greater abundance in which it is now obtained has diminished the value of ornaments made of it. It is very commonly associated with ores of tin, silver, lead, and copper, occurring chiefly in veins, but is found also by itself in drusy cavities in granite, greenstone, etc. It is nowhere more abundant than in England, particularly in Derbyshire and in Cornwall. In Cornwall, it is used as a flux for reducing copper ore. In Derbyshire, the blue massive variety is known to the miners as *Blue John*; and F. spar is often called DERBYSHIRE SPAR. FLUORIC, a. *flō-ōr'ik*, pertaining to fluor or obtained from it. FLUORINE, n. *flō-ō-rīn*, an elementary body related to chlorine (see below). FLUORIDES, n. plu. *-rīdz*, compounds of fluorine and a metal: *Fluoride of Aluminium and Sodium* is the mineral Cryolite (q.v.: see also ALUMINIUM): *Fluoride of Calcium*, is fluor, or fluor spar. FLUORES'CENCE, n. *-rēs'sēns*, the property of certain rays of a spectrum becoming visible from a change in the rates of their vibrations, the property possessed by certain bodies of intercepting and absorbing chemical rays of sunlight, and afterward showing them in the dark. This effect is observable especially in a dilute solution of sulphate of quinine (see PHOSPHORESCENCE). FLUORES'CENT, a. *-rēs'sēnt*, of or pertaining to fluorescence. FLUOROTYPE, *flō-ō-rīp*, process, or its result, in which salts of fluoric acid are employed for producing pictures by the agency of light; suggested by Robert Hunt, 1844. Two solutions are prepared: one containing 20 grains of bromide of potassium to an ounce of water; and the other, 5 grains of fluoride of sodium to an ounce of water. These are mixed together just previous to using, and applied uniformly over the whole surface of good paper, which is then allowed to dry, and afterward rendered sensitive by brushing over it a solution of nitrate of silver, 60 grains to an ounce of water. Papers so prepared may be used for production of pictures in the camera or printing-frame; they require, however, to be intensified by development with protosulphate of iron, the reducing action of which should be regulated by the addition of acetic acid to the solution. The sensibility of the papers for camera-work may be much increased by brushing over them a weak solution of protochloride of tin previous to exposure.

FLUORINE, *flō-ō-rīn*: elementary substance allied to chlorine. Its principal natural source is the mineral, fluor spar (CaF_2), though it is found in minute quantities also in the igneous rocks, natural waters, plants, the bones and teeth of animals, as also in milk, blood, etc. Many attempts have been made to isolate fluorine, but all failed up to recent date. It has now been produced by Henri de Moissan by electrolysis of hydrogen potassium fluoride (HF.KF). A platinum U tube with fluor-spar stoppers

FLURRY—FLUSH.

was used for the decomposition. It is a colorless gas possessing the most intense affinities for other elements. Its equivalent number is 19. (For account of this achievement, see *Annales de Chimie et Physique*, 1887, Dec.) In 1896, M. de Moissan and Prof. James Dewar finally succeeded in liquefying F. gas at a temperature of -185° C. (abt. -301° F.). The few compounds of F. are important. *Hydrofluoric acid* or *fluoric acid* (HF) is generally prepared by heating gently in a lead still a mixture of one part of fluor-spar (Ca_2F) with two parts of sulphuric acid (H_2SO_4), when the vapors of hydrofluoric acid (HF) are evolved, while sulphate of lime (CaSO_4) is left in the still. The dense acid vapors are conducted through a lead pipe into a lead receiver or bottle, surrounded by a freezing mixture of ice and common salt. The acid is generally mixed with water when desired to be kept some time. When the most concentrated hydrofluoric acid is required, the still and receiving vessel must be made of platinum. The other metals are not suitable for such apparatus, as they are rapidly corroded by the acid. When prepared in its strongest form, hydrofluoric acid has the density of 1,060 (water = 1,000), and is a colorless, fuming liquid of great volatility, which boils at 60° F., and does not freeze at -4° F. Not only does hydrofluoric acid corrode and dissolve the ordinary metals (excepting lead and platinum), but when placed on the skin it produces a severe burn, owing to its caustic nature. The most important property which hydrofluoric acid possesses is its power of eating into and dissolving glass, which admits of its application in the etching of characters upon glass, as in thermometer tubes, and for eating away greater or less thicknesses of plates or sheets of colored glass, so as to produce a variety of shades: see GLASS and GLASS-PAINTING.

FLURRY, n. *flŭr'ri* [a corruption of **FLUSTER** or **FLUTTER**, which see]: bustle; violent agitation; commotion: V. to bustle greatly; to put in agitation. **FLUR'RYING**, imp. **FLUR'RIED**, pp. *-rid*, agitated; alarmed.

FLUSH, v. *flŭsh* [Dut. *fluysen*, to flow with violence, to rush: Scot. *flusch*, a run of water: Norw. *flust*, abundantly; *flus*, open-handed; imitative of the sound of flowing water]: to redden suddenly; to glow; to blush; to cause redness; to elate; to flow suddenly; to flood or inundate with water: N. sudden glow; redness of the face from an afflux of blood; a sudden flow of water: ADJ. fresh; full of vigor; abounding; even or level with, as the water of a river with its banks in time of flood: said of a deck of a vessel when it extends without break on one level from bow to stern; but 'flush-decked ships of war' technically are such as have all their guns on the upper deck: AD. so as to be even or level with. **FLUSH'ING**, imp.: N. a flowing of blood into the face; a glow of red in the face. **FLUSHED**, pp. *flŭsh't*. **FLUSH'NESS**, n. abundance. **FLUSH OF MONEY**, having abundance of money. *Note*.—**FLUSH**, to redden, appears to be a different word from **FLUSH**, to flow suddenly, and may be derived from such a form as prov. Sw. *flössa*, to

FLUSH—FLUSTRA.

blaze, and be connected with FLARE, but the senses have become confused—see Skeat.

FLUSH, a. ad. *flűsh* [Sp. *flux*, cards of a suit]: in *card playing*, all of a suit, as, 'I am *flush*,' '*flush* hand.'

FLUSHING, *flűsh'ing*: village of Queens co., N. Y.; on F. Bay and the F. and North Side, and the Long Island railroads; 7 m. from New York, and directly connected with it by a line of steam ferryboats. F. is one of the oldest nursery centres in the country, and for more than two centuries has been noted for its elegant trees and the care bestowed on them. Almost every avenue is planted with a single kind; one is a veritable arboretum, having on each side one of a pair of nearly every variety in ordinary cultivation, and some rare ones. F. contains 10 churches, 8 Sunday schools, church property valued at \$100,000, public high school that cost (1875) \$65,000, several grammar and primary schools, F. Institute (1828), St. Joseph's Acad., St. Mary's Seminary, St. Michael's School, gas and Holly water-works (cost \$200,000), town hall, branch of the New York Infant Asylum, private retreat for the insane, beautiful park, a soldiers' monument, state bank (cap. \$25,000), and savings bank. F. was settled by Quakers prior to 1662. Its chief industries are gardening, nursery business, and fruit raising; became part of New York city, 1898.

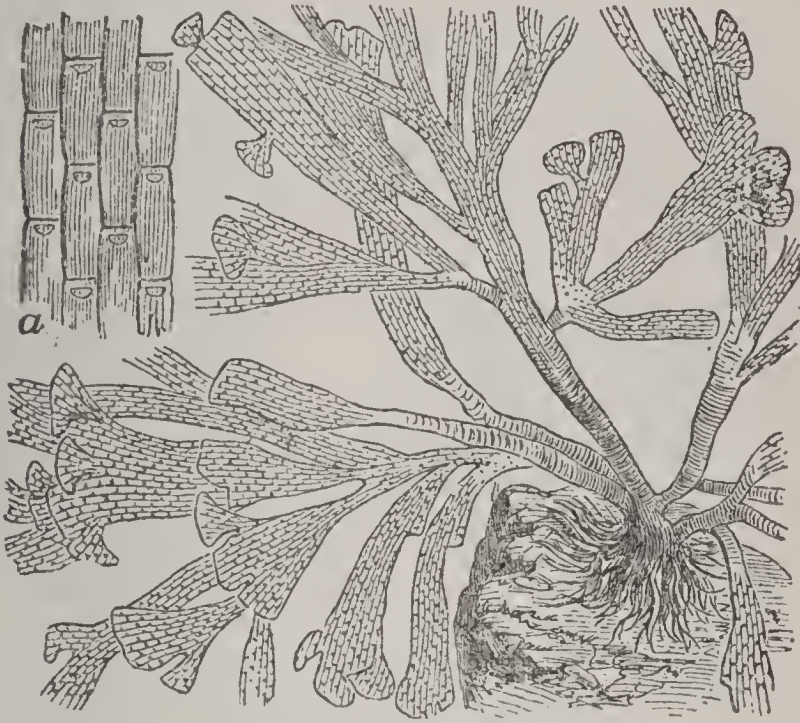
FLUSHING, *flűsh'ing* (Dutch *Vlissingen*): strong fortress and seaport of the Netherlands, province of Zeeland, on the s. coast of the island of Walcheren, on the n. shore of the mouth of the Western Scheldt; lat. 51° 26' n., and long. 3° 36' e. It was formerly an important naval station of the Netherlands, and had extensive dockyards and arsenals. The harbor can receive large sea-going vessels, and considerable trade is carried on with England, India, and other countries. A railway through Zeeland to join the main continental lines has its terminus station close to the harbor, and there is daily service by superior steamers between F. and Queensborough, on the London Chatham and Dover railway. F. is strongly fortified, and commands the entrance of the Scheldt. It is the birthplace of Admiral de Ruyter. It was stormed and taken by the English in the Walcheren expedition under Lord Chatham 1809. Pop. about 15,000.

FLUSTER, v. *flűs'tér* [Icel. *flaustr*, over haste: Wal. *flusturá*, to raise a wind: allied to *bluster*]: to agitate; to confuse; to be in a heat or bustle: N. hurry; bustle; confusion; disorder. FLUSTERING, imp.: ADJ. bustling; flurrying. FLUSTERED, pp. -*térđ*: ADJ. confused; tipsy.

FLUSTRA, *flűs'tra*: genus of zoöpnyles, of the class *Polyzoa* (or *Bryozoa*), and order *Cheilostomata*. The name is said to have been derived by Linnæus from the Saxon *flustrian*, to weave, because of the mat-like structure of the polypidoms, which in this genus are extremely plant-like, and by unscientific observers are generally regarded as belonging to the vegetable, and not to the animal kingdom. In some species the polypidom assumes the appearance of a branching frond, with polyp cells either on one side only,

FLUTE.

or on both sides; in others, it extends as an incrustation on rocks, shells, sea-weeds, etc. The polyp cells are arranged quincuncially, and are in juxtaposition, more or less quadrangular, flat, and with a distinct border, which is sometimes furnished with teeth of short spines. The polyps have the power of moving either the whole head at once, or the tentacles separately, and show no little activity, so that a living *F.*, seen through a magnifying-glass, is a most beautiful and interesting object. A common British species is *F. foliacea*, which grows on hard ground in a few



Portion of *Flustra truncata* (from Johnston's *Zoophytes*):
a, a few cells modified.

fathoms' water, and is continually found torn up by the waves, and scattered on the shore. The same species occurs in the Pacific Ocean.—A single sq. inch of *F. carbasea*, another common British species, has been found to contain 1,800 cells; and as there are about ten sq. inches in an average polypidom, a single specimen may ordinarily contain about 18,000 polyp heads.

FLUTE, n. *flût* [F. *flute*; OF. *flaute*, a flute—from *flaüter*, to blow into a wind instrument—from It. *flauto*, a flute—from L. *flütus*, blowing, breathing: Ger *flöte*, a flute]: one of the oldest wind instruments, well known to the ancient Greeks, with a soft and pleasant quality of tone. It is an important instrument in orchestral music, and, in consequence of its easy treatment, is much in favor with amateurs. The flute is commonly of boxwood or ebony, sometimes of ivory or silver. Its form is that of a taper tube, made in four pieces, with six holes for the fingers, and with from one to fourteen keys, which cover or open other holes. The sound is produced by blowing from the mouth into the embouchure, an oval kind of hole at one side of the

FLUTE.

thick end, which is done by the lips covering a part of the hole, so that the air in its passage from the mouth is broken against the opposite edge of the hole, which causes the column of air inside the tube to vibrate. The notes of the gamut are produced by the opening or shutting of the holes by the fingers of both hands. The compass of the flute is from D to A sharp, 19 diatonic intervals. For solo playing, a flute with a compass from G to C is sometimes used. For orchestral purposes, there are also the *tierce* flute, the octave flute, the E flat and F piccolo flute, and the highest of all, the C piccolo. FLUTE, v. to channel or furrow, as if with pipes. FLUTING, imp.: N. in *arch.*, moldings in the form of hollows or channels cut vertically on the surface of columns. These were adopted by the Greeks as ornaments to their Doric, Ionic, and Corinthian columns, and were retained by the Romans. The Tuscan is the only style without flutes. In Doric (fig. 1), there are 20 flutes

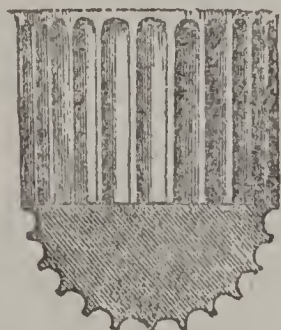


Fig. 1.

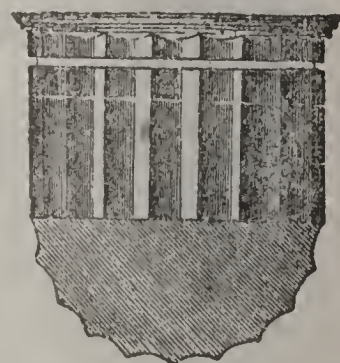


Fig. 2.

on the circumference, and the curves meet with a sharp edge. These curves are supposed, in Greek Doric, to be elliptical, and they are carried up across the necking to the base of the cap. In the other styles, there are 24 flutes on the circumference (fig. 2). These are semicircular, and are separated by a small fillet; and, before reaching the necking and the base, are terminated with semicircular top and bottom. Flutes are said to be cabled when they are filled in to about one-third of their height from the base with a convex bead. This is to strengthen the column and protect the flutes. In countries where Roman remains were abundant, as in s. France, fluting was sometimes adopted by the early mediæval architects, as at Arles and Autun. In Italy also, traces of this decoration are visible during the middle ages; but the flutes soon ceased to be vertical, and, in Romanesque Architecture (q.v.), assumed many varieties of forms, such as curves, zigzags, etc., twisting round the shafts.—In *laundry*, fluting is an ironing of starched articles into grooves like flutings on a column. FLU'TED, pp. channelled or furrowed, appearing like a flute cut in two. FLU'TER, n., or FLU'TIST, n. one who plays on a flute—also FLAUTIST, which see. FLUTE-work, class of stops in organ-building, so termed in distinction from *reed-work*. There are also numerous stops in German organs, specially designated with the names of

FLUTTER—FLUX.

flutes of different kinds, of eight ft. and four ft. pitch, some of which have of late years been introduced into English and American organs.

FLUTTER, v. *flüt'ter* [Low Ger. *fluttern*; Ger. *flattern*, to make a flapping or flutter: Dut. *fledderen*, to flap the wings; imitation of a flapping noise]: to move or flap the wings rapidly or irregularly; to hover; to drive in disorder as frightened birds; to move about quickly and nervously; to be in agitation: N. vibration; quick and irregular motion; hurry; agitation of the mind; disorder. **FLUTTERING**, imp.: N. act of hovering or flapping the wings without flying; agitation: **ADJ.** flapping the wings without flight. **FLUTTERED**, pp. *-tërd*. **FLUTTERINGLY**, ad. *-lî*.

FLUVIAL, a. *flô'vî-äl*, or **FLUVIATILE**, a. *-ä-tîl* [F. *fluvial*—from L. *fluvialis*, pertaining to a river—from *fluvius*, a river: It. *fluviale*]: pertaining to a river; produced by river action; growing or living in fresh-water rivers. **FLUVICOLINÆ**, n. *-kô-lî nê* [L. *colo*, I inhabit]: in *ornith.*, a sub-family of *Muscicapidæ*, or Fly-catchers, found in S. America; sometimes called *Alectrurinae*. **FLUVIOMARINE**, a. *-ô mã-rên'* [L. *mārē*, the sea]: in *geol.*, applied to stratified deposits having a mixed river and sea origin; estuarine.

FLUX, n. *flûks* [L. *fluxus*, a flow—from *fluō*, I flow: It. *flusso*: F. *flux*]: any flow or issue of matter; matter discharged; fusion; a moving or passing in continued succession. In *med.*, a discharge generally from a mucous membrane. The term is applied to all preternatural fluid evacuations from the body, but especially to those from the bowels, and from the uterine organs. Dysentery (q.v.) was long termed the bloody flux, to distinguish it from simple diarrhea. Another scientific term for flux is *Profluvium*, which gives the name to a large order of diseases in Cullen's *Nosology*. See also **CATARRH: MENSTRUATION**: and, with respect to etymology only, **RHEUMATISM**. In *metallurgy*, substance added in the smelting of metals to promote their fusion. *White flux* is an intimate mixture of 10 parts of dry carbonate of soda and 13 parts of dry carbonate of potash, and is mainly instrumental in withdrawing the silica or combined sand from mineral substances; *black flux* is prepared by heating in close vessels ordinary cream of tartar (bitartrate of potash), when an intimate mixture of finely divided charcoal and carbonate of potash is obtained. The latter flux, when mixed with finely divided metallic ores, and the whole raised to a high temperature in a furnace, is useful not only in removing the silica, which the carbonate of potash in it enables it to do, but also the charcoal withdraws the oxygen from the metallic oxide, and causes the separation of the pure metal. Limestone is used as the flux in the smelting of iron ores. Other fluxes are fluor spar, borax, protoxide of lead, etc. See **IRON: COPPER**: etc. **FLUX**, a. inconstant; not durable: V. to melt; to cause a flux or evacuation. **FLUXING**, imp. **FLUXED**, pp. *flûkst*. **FLUXIBLE**, a. *flûks'î-bl*, capable of being melted or fused. **FLUXIBILITY**, n. *-bîl'î-tî*, the quality of being fluxible. **FLUXION**, n. *flûk'shûn* [F,—

L.]: act of flowing; the matter which flows. FLUX'IONS, n. plu. branch of mathematics (see below). FLUX'IONAL, a., or FLUX'IONARY, a. -ér-î, pertaining to fluxions. FLUX'IVE, a. *flûks'iv*, in *OE.*, flowing with tears.

FLUXIONS, *flûk'shûnz*, in Mathematics: branch of science, treating of the analysis of infinitely small variable quantities—called also the *Differential Calculus*. The method of F. invented by Newton was intimately connected with the notion of velocity uniform and variable; and extended that notion, derived from the consideration of a moving point, to every species of magnitude and quantity. It proposed to determine, in all cases, the rate of increase or decrease of a magnitude or quantity whose value depends on that of another, which itself varies in value at a uniform and given rate. If x and y represent two such quantities, and $y = F(x)$ represent the law of their dependence, and if \dot{x} be supposed to be the velocity with which x increases, and \dot{y} that with which y changes value, Newton undertook by his method to express \dot{y} in terms of \dot{x} and of x , or to find $\dot{y} = F_1(x) \cdot \dot{x}$. The quantities x and y , which in modern language we call the variables, he called *flowing quantities* or *fluents*, and \dot{x} , \dot{y} , which we should represent by dx and dy , and call differentials, he called the *fluxions* of x and y : see CALCULUS, THE INFINITESIMAL. To illustrate his notation: suppose $y = x^n$, it may be shown that $\dot{y} = nx^{n-1}\dot{x}$. Regarding now \dot{y} as a quantity depending on x and \dot{x} , and supposing x to increase uniformly, in which case \dot{x} is constant, and \ddot{x} its fluxion zero, we observe that \dot{y} may have a fluxion, for it depends on the value assumed by $nx^{n-1} \cdot \dot{x}$, when x further changes. We find $\ddot{y} = n \cdot (n-1) \cdot x^{n-2} \cdot (\dot{x})^2$. Thus, second fluxion or velocity of \dot{y} , or \ddot{y} , Newton wrote \ddot{y} . If x had a second fluxion, or did not change uniformly, then that fluxion he wrote \ddot{x} . The third fluxion of y he wrote \dddot{y} ; and so on, pointing as many points over the fluent as there are units in the order of the fluxion. For the fluent, he had no special symbol. Instead of $\int nx^{n-1}dx = x^n$, according to the modern notation, he wrote $\boxed{nx^{n-1} \cdot \dot{x}}$, putting the expression in an inclosure. For the principles on which Leibnitz founded his calculus and its notation, see CALCULUS (as above).

FLY, n. *flî* [AS. *fleoga*; Icel. *fluga*, a flying insect (see next FLY)]: popular name for insects of the order *Diptera* (q.v.) generally; sometimes extended to insects of other orders, sometimes limited to the *Muscides* (q.v.). It is often used with a prefix, as house-fly, blow-fly, etc., to designate particular kinds of insects. FLIES, plu. *Fly* denotes also something light or swift; a light carriage let on hire. FLY-BLOW, v. -blô, to taint with the eggs of a fly, which produces

FLY—FLY-CATCHER.

maggots, or by its droppings: N. the egg of a fly. FLY-BLOWN, a. tainted with maggots. FLY-POWDER, name of various compounds for killing flies; one kind used in Europe is a poisonous compound of metallic arsenic and arsenious acid, obtained by the partial oxidation of the metal on exposure to air. FLY-TRAP (see DIONÆA).

FLY, v. *flī* [Ger. *fliegen*; Icel. *fluga*; Dan. *flyve*, to fly]: to move through the air on wings, as a bird or insect; to pass on or away swiftly; to run or retreat rapidly, as an army; to move with great speed; to cause to rise with air; to break or part suddenly; to rush at or attack suddenly; to shun; to avoid. FLYING, imp. *flī'ing*: ADJ. floating; waving; light, and suited for prompt and rapid motion: N. act of moving in the air (see below). FLIER, n. one who or that which. FLEW, pt. *flō*, did fly. FLOWN pp. *flōn*, moved through the air; passed away. FLY'ERS, n. plu. a flight of stairs that do not wind. FLY-AGARIC, *-a-gār'ik*, in bot., *Agaricus muscarius*, a scarlet fungal covered with white or yellow warts. It grows in birch woods and is used to poison flies. FLY-BOAT, a swift boat used on canals. FLY-BOY, boy who lifts the printed sheets off the press, catching them as they fly from the tympan. FLYING-BRIDGE, temporary contrivance to enable an army rapidly to cross a river (see PONTOON: FERRY). FLYING-BUTTRESS, in arch., a curved brace or half arch for strengthening the part of a building which rises considerably above the rest. FLYING FOX (see KALONG: see also FLYING LEMUR). FLY-LEAF, the blank leaf at the beginning and end of a book. TO FLY IN THE FACE, to act in defiance; to insult. TO LET FLY, to discharge. TO COME OFF WITH FLYING COLORS, to be successful or triumphant. TO FLY OPEN, to open suddenly or with violence. TO FLY OUT, to rush out; to burst into a passion.

FLY'-CATCH'ER (*Muscicapa*): genus of birds of the order *Insectores*, tribe *Dentirostres*, family *Muscicapidæ*, having a moderately long angular bill, broad and depressed at the base, compressed and slightly curved at the point; the base surrounded with hairs or bristles directed forward, and which help to secure insect prey. The legs and feet are small; the outer toe the longest, and attached to the middle one as far as the first joint. The wings are not long; the first quill-feather is very short; the third is the longest. The birds of this genus, as now restricted, are confined to the old world, and mostly to the warmer parts of it. Of the numerous American birds often called fly-catchers, some belong to nearly allied genera, and others to genera not now ranked even in the same family. The true fly-catchers all have the same habit—characteristic of many of the *Muscicapidæ* besides this genus—of remaining perched for a long time in the same spot, leaving it only to make a sudden dart at a passing insect, which is seized with a snap of the bill, and then returning. They are almost never seen running on the ground, or even on the branches of trees, and do not chase insects in the air, like swallows. Only four species are European, two of which are British—the

FLY-CATCHER.

SPOTTED F. (*M. grisola*) and the PIED F.-C. (*M. atricapilla* or *luctuosa*); birds about the size of a sparrow, the former of which is common in most parts of England, as a summer bird of passage: the latter is abundant in Europe. The spotted F.-C. is brownish gray above, white beneath, the head and breast marked with dusky spots. Its voice is a mere chirp. It is remarkable for its choice of situations for its nest, often on a beam in an out house, on the side of a fagot-stack, on the branch of a tree trained against a building, sometimes even on a lamp-post in a street. Mr. Durham



Spotted and Pied Fly-catchers (*Muscicapa grisola* and *M. atricapilla*).

Weir, of Boghead, a diligent observer of the habits of birds, mentions that he witnessed a single pair of spotted fly-catchers feed their young no fewer than 537 times in one day, and that their motions were so rapid that he could not keep his eyes off the nest for a moment.

The name F.-C. is often extended to other genera, and is sometimes used as co-extensive in signification with that of the family *Muscicapidæ*.

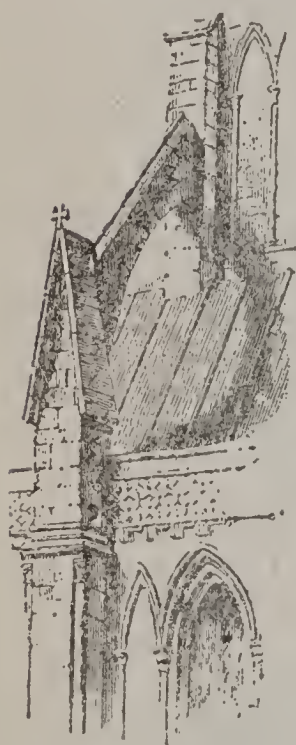
FLYING.

FLYING, or FLIGHT: locomotion of an animal in the air, by means of *wings*, organs specially adapted to that purpose. By means of these organs, the animal raises itself from the ground and sustains itself in the air, as well as moves forward in any direction. Birds and bats are the only existing vertebrate animals possessing the power of true flight; the lateral membranes of Flying Squirrels, Flying Lemurs, Flying Phalangers, and Flying Dragons, and probably even the great pectoral fins of Flying Fishes, serving only to sustain them in the air after the manner of a parachute, or at most to aid, on the principle of a boy's kite, in an oblique ascent. The extinct reptiles called Pterodactyles (q.v.) possessed, however, the power of true flight, as there remains sufficiently testify; and their wings were constructed on a plan as different from those both of birds and of bats as these (see BIRDS and BATS) are from each other. The wings in all vertebrate animals are the anterior limbs, and are thus homologous to the arms of man and the forelegs of ordinary quadrupeds; in birds, the bones answering to those of the hand are much abbreviated and consolidated; in bats, they are prodigiously elongated; in pterodactyles, there was an elongation of a single finger. Among birds, though the power of flight is general, there are exceptions to the rule, the wings of some being merely rudimentary, and at most helpful to them only in running, those of others being adapted to swimming, not on but under water.—The only invertebrate animals possessing the power of flight are insects; to the greater part of which vastly numerous class it belongs in their perfect state, though there many insects quite destitute of it, and this is sometimes the case with species very closely allied to others which possess it; sometimes this great difference exists between the sexes of the same species. The wings of insects are not at all homologous to those of the flying vertebrata, though applied to the same use, and in structure are widely different from them all: see INSECTS.

In flying, the wings are made to beat or strike the air. The stroke in the one direction, however, must be very different from that in the other, or rather from that movement by which the wing is brought back to its place for another stroke. This difference is secured partly by greater force of muscular action, and consequent rapidity; the resistance of the air varying as the square of the velocity with which the wing moves in giving the stroke. But it is secured partly also by the conformation of the wing itself, the quill feathers of birds being so placed that they strike the air with their greatest extent of surface in the proper stroke of the wing, and *obliquely as it returns to its place*. An imitation of this is made in the rowing of a boat, and is called *feathering the oar*. The wings of bats, consisting of a membrane extended upon jointed bones, are probably in part folded up in order to the return from every stroke; and this is perhaps the case with the wings of some insects; also, though those of others—as the Common Fly and the Bee—are certainly incapable of it; yet it is possible that even these may have a greater degree of rigidity communicated to them by the inflation of their air-tubes during the stroke than they have during the return.



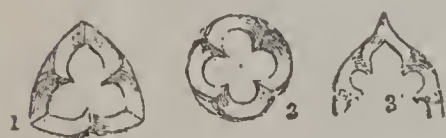
Flying.—Flight of Crested Heron, 10 images per second.



Flying-buttress,
Beverley Minster.



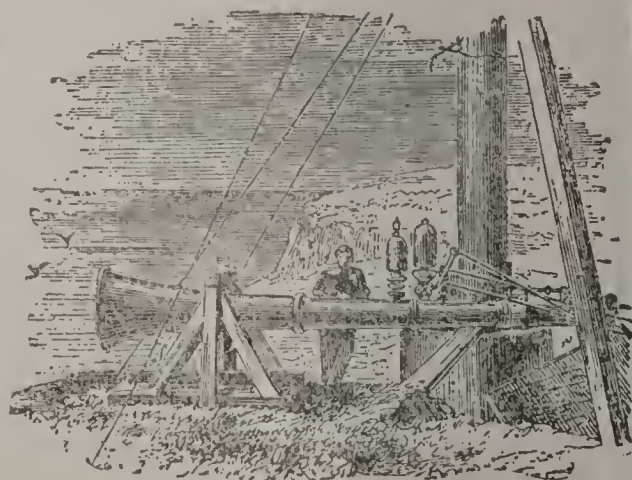
Flying Lemur (*Galeopithecus volans*).



Foil.—1, 2, Trefoil and Quatrefoil Openings; 3, Cinquefoil Arch.



Fencing Foils.



Siren Fog-horn, Southern Coast.

FLYING.

Flying is analogous to swimming; but the difference of medium is very great, fresh water being about 800 times heavier than air, and the density of sea-water still greater. The bodies of animals intended for flight are therefore sometimes adapted to it partly by means which tend to diminish their proportionate weight, as the air-cavities in birds and insects; which, however, are still more important in relation to the increase of muscular power; and it is chiefly by the increase of muscular power that the power of flying is imparted. The exercise of strength requisite for swimming is comparatively small, about $\frac{1}{700}$ part only of that which is requisite for flying. How wonderful, then, the muscular powers of birds capable of long-sustained flight, far exceeding in rapidity the speed of the swiftest locomotive engine ever constructed by man! or of insects, whose flight, in respect at least of rapidity, is in some species not inferior to that of the swiftest birds! The muscular power exerted in flying evidently differs very much both among birds and among insects. The large wings of some require much less frequent muscular action, either to sustain the body in the air, to elevate it, or to move it forward, than the comparatively small wings of others. The motion of the wings of humming-birds and of insects is too rapid for the eye to follow.

It is not to be wondered at that projects of locomotion through the air have been much entertained by men, nor that, while the force of the objections above stated was unknown, artificial wings and an imitation of the flight of birds occupied the ingenuity of inventors. Grecian fable ascribes success to the mythic Dædalus (q.v.), who is said to have passed safely over the Ægean Sea on wings which he himself had made. More modern stories of similar success, though in far shorter flights, are numerous, but resolve themselves into exaggerated accounts of feats on ropes, or by some parachute-like contrivance. In the 13th or 14th c., Elmerus, a monk, is said to have flown more than a furlong from the top of a tower in Spain, but the distance is probably much exaggerated; and, in the 17th c., Besnier, a locksmith of Sable, in France, who prudently began from windows one story high, ventured at last, and safely, to leap from very elevated positions, and so passed over houses or over rivers of considerable breadth. Such feats they encouraged the expectation of better results, cherished by some of the most scientific men of that period. Bishop Wilkins, in particular, gave much attention to this subject. Perceiving the inadequacy of the human arm, and the muscles which move it, to give sufficiently rapid motion to wings of sufficient size, he suggests that 'it were therefore worth the inquiry to consider whether this might not be more probably effected by the labor of the feet, which are naturally more strong and indefatigable.' So confident was he of success, that he anticipated the time when a man should as readily call for his wings to make a journey, as he then did for his boots and his horse. More recently, in the end of the 18th and beginning of the 19th c., Sir George Cayley occupied himself with speculations and experiments on this subject. **Acknowledging the diffi-**

FLYING.

culty which arises from the want of muscular strength in man, he says: 'It is only necessary to have a first mover which will generate more power, in proportion to its weight, than the animal system of muscles.' But this first mover has not hitherto been found. The employment of steam for this purpose has been frequently proposed. Attempts of this kind, however, have for their object aerial navigation, rather than artificial flying properly so called; though the inventions have been variously designated aerial ships, flying machines, etc. A great difficulty has been found in the weight of the steam-engine and its fuel; and expensive experiments have signally failed through miscalculation on this essential point. Frequently, attempts have been made to combine some modification of the balloon with the steam-engine or other means of propulsion. In no instance hitherto has there been the least approach to success, though a *European Aeronautical Society* was formed, and issued its advertisements 1835; and, about eight years afterward, an *Aërial Transit Company* not only amused the



Flying Machine, invented by Mr. Henson, 1843.

public for a considerable time, but obtained the assent of the British House of Commons to a bill for its constitution. Models have sometimes been exhibited of aerial machines capable of being guided at the pleasure of the aeronaut, in a perfectly still atmosphere, but nothing has yet been invented capable of serving any practical or useful purpose. There is, however, nothing evidently contrary to science or sound philosophy in proposals for aerial navigation, which, in this respect, differs widely from human or artificial flying.

The *aëronautic fish*, on which Marshal Ney is said to have spent 100,000 fr., for a considerable time occupied the attention of some of the most ingenious and scientific men in France. It was a large balloon, of a long fish-like figure, intended to swim in the air, as a fish in water, and to be propelled by wings or fins working by cranks. But when launched, though it floated and moved forward a little, it turned on one side, and this tendency could not be corrected; so that the experiment proved a complete failure. Dr. Pettigrew's *Animal Locomotion* and M. Marcy's *Animal Mechanism* (both in the *International Science Series*), and the controversy regarding theories of flight, in *Nature* (1874)

FLYING DRAGON—FLYING FISH.

and elsewhere, are important contributions to the literature of the subject. See AERIAL NAVIGATION.

FLYING DRAGON or **FLYING LIZARD** (*Draco*): genus of crassilingual lizards allied to the iguanas and stellions, but remarkably distinguished from them, and indeed from all other reptiles now existing, by lateral membranes which support them in a parachute-like manner in the air, and enable them to pass from tree to tree, even to considerable distances. These membranes are supported on the first six false ribs, which, instead of encircling the abdomen, stand out at right angles from the body for this purpose. They are incapable of the movements requisite for true flying; when not in use, they are folded close to the body. There is also in the flying dragons an inflatable pouch under the chin, sustained partly by the hyoid bone and partly by two small bones. The tail is long. The scales are small and imbricated; those of the tail and limbs are keeled. The tongue is extensile, but not greatly so. All the species are small, live in trees, and feed on insects. They are natives of the E. Indies. The genus is subdivided by some naturalists. See figure under title DRAGON.

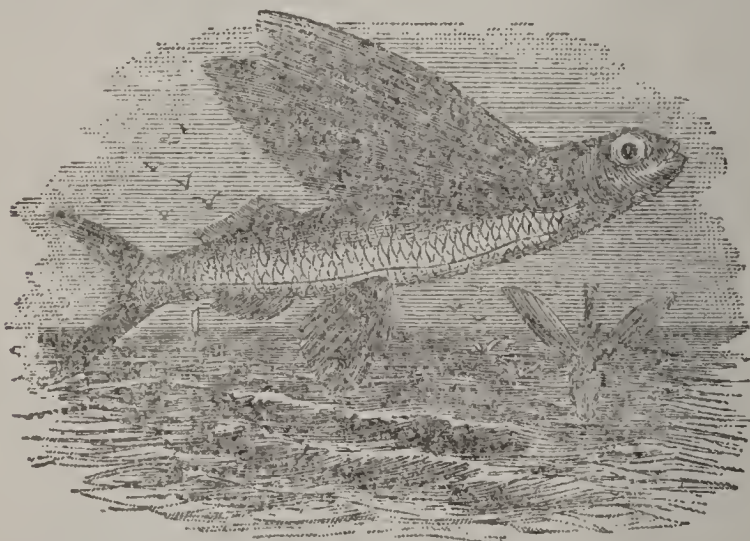
FLYING DUTCHMAN: in sailors' legends, a mariner who was compelled, as a penalty for his sins, to course the seas around the Cape of Storms unceasingly, without ever being able to reach a haven. Seamen who saw his black spectral ship on the horizon quickly changed their course and hastened to fly from his fatal influence. The notion that gave foundation to this legend is widespread in German mythology. The dead crossed the water in boats and ships, and northern heroes were sometimes buried in their ships, sometimes placed in a ship which was taken out to sea, and allowed to drift with the waves; and the same story is localized in the German Ocean, where Herr von Falkenberg is condemned to beat about the ocean until the day of judgment, on board a ship without helm or steersman, playing at dice for his soul with the Devil. The legend has been treated by Richard Wagner in his opera *Der fliegende Holländer*.

FLYING FISH: fish which has the pectoral fins so very large that by means of them it is sustained in short seeming flights in the air. Such fishes belong to two very different families—*Scomberesocidae* and *Sclerocgenidae*; but the name F. F. is sometimes limited to those of the former family, the genus *Exocoetus*; those of the latter being known as *Flying Gurnards* (q.v.). The genus *Exocoetus* has the pectoral fins nearly as long as the body, the dorsal fin placed over the anal, the tail forked, and its lower division considerably larger than the upper. It is subdivided by some naturalists into several genera, characterized by the presence or absence of barbels, etc. One species (*E. volitans*) is very abundant in the warmer parts of the Atlantic Ocean, the other (*E. exiliens*) is common in the Mediterranean. In the former, the ventral fins are far forward, and short; in the latter, they are far back, and considerably elongated. More than 30 species are known, all in-

FLYING FISH.

habiting the seas of the warmer parts of the world, and having their respective geographical limits well defined.

They swim in shoals; and whole shoals—varying in number from a dozen to a hundred or more—often leave the water at once, darting in the same direction through the air, and after descending into the water at a distance of 200 yards, or even more, from the place where they arose, quickly renewing their flight. These flights of flying-fishes form one of the most interesting spectacles which relieve the monotony of a voyage in tropical seas. Sometimes, the coryphæa (dolphin) may be seen in rapid pursuit, taking great leaps out of the water, and gaining upon his prey, which take shorter and shorter flights, vainly trying to escape their persistent foe, until they sink at last exhausted: sometimes the larger sea-birds catch flying fishes while they are in the air; but it does not seem to be at all true that these fishes leave the water, as has been very generally imagined, merely to escape from danger, nor is there



Flying Fish (*Exocoëtus volitans*).

any good reason for that sentimental pity which has been often expressed with regard to them, as creatures harassed and persecuted more than others, and peculiarly exposed to dangers both in the sea and in the air. They seem rather to exercise their powers, like other creatures, very often merely from the delight which they take in the exercise of them, and in an exuberance of activity. The question, whether or not the flying fishes use their pectoral fins at all as wings is not completely decided; some observers, well entitled to respect, maintain that they do, though of course the power of flight is limited to the time that the fins remain quite moist; but a great preponderance of testimony is in favor of the opposite opinion, which regards the fins as acting merely after the manner of a parachute or of a kite. Flying fishes sometimes rise 20 ft. above the water, though they more frequently skim along nearer its surface. They often fall on the decks of ships. They are good food, and the natives of the South Sea Islands take them by means of small nets attached to light poles, like

FLYING GURNARD—FLYING LEMUR.

those in which anglers catch minnows for bait. For this purpose, they go out at night in canoes, to the outer edge of the coral reefs, with a torch, which enables them to see the fishes, and perhaps both attracts and dazzles them.

FLYING GURNARD (*Dactylopterus*): genus of fishes of the family *Sclerogenidae* or Mailed Cheeks, nearly allied to the Gurnards (*Trigla*), but remarkably distinguished by the great size of the pectoral fins, which they use for the same purpose and in the same way as the *Exocoeti*: see **FLYING FISH**. The pectoral fins are, however, of very different appearance from those of the *Exocoeti*, widening almost to the end, which is rounded, and the tips of the rays extending considerably beyond the membrane. A very long spine rises from the back of the head. One species (*D. volitans*) is common in the Mediterranean, and is sometimes 15 inches in length. Its flight is said not to extend



Flying Gurnard (*Dactylopterus volitans*).

to more than about 40 yards, but it sometimes rises high enough to fall on the decks of large ships. 'At particular times, especially on the approach of rough weather, in the night, numbers of them may be seen, by the phosphoric light which they emit, making their arched passages in apparent streams of fire.'—Another species inhabits the Indian seas.—Some species of *Apistes*, belonging to the same family, have similarly large pectorals, and make similar flights.

FLYING LEMUR, or COLU'GO (*Galeopithecus*): sometimes called also **FLYING CAT** and **FLYING FOX**, genus of mammalia, generally regarded as constituting a distinct family, *Galeopithecidae*, which by some naturalists is placed, as by Cuvier, among the *Cheiroptera* (see **BAT**), though it is now more commonly associated with the Lemurs (q. v.), as by Linnæus. There are, indeed, evident affinities both to lemurs and bats, but chiefly to the former, with which the osteological and other anatomical characters generally agree. Along the sides extends an ample membrane or fold of the skin, beginning behind the throat, and including both the fore and hind legs as far as the toes, but leaving them free, and further stretched along both sides of the tail to the tip. In the last particular, it differs from the

FLYING PHALANGER.

lateral membrane of the flying squirrels and flying phalangers, and more resembles that of bats; but it widely differs from that of bats in being comparatively thick, and covered on both sides with short thick hair; and still more in leaving the fore-feet free, and not being stretched on lengthened fingerbones. Nor can it be used for true flight, but only to support the animal in the air like a parachute, enabling it to take enormous leaps of abt. a hundred yards in an inclined plane. It is not yet determined whether the differences to be observed between the specimens of flying lemurs in collections, are to be regarded as differences of species or of variety. Attempts have been made to distinguish several species, but it is difficult on account of their great similarity. They are from 20 to 24 inches in total length, are natives of the Indian Archipelago, inhabiting lofty trees in dense forests, and feeding on small birds' eggs and fruits, as well as on insects. They are nocturnal in their habits. They are very inoffensive, and scarcely attempt to bite even when seized. Their voice resembles the low cackling of a goose. They produce generally two young ones at a birth. The Pelew islanders greatly esteem them as food, but they have a rank unpleasant smell.

FLY'ING PHALAN'GER, or FLY'ING OPOS'SUM (*Petaurus*): genus of marsupial quadrupeds, containing several species, natives of New Guinea and of Australia, where



1, Flying Phalanger (*Petaurus taguanoides*);
2, Flying Mouse (*Petaurus pygmaeus*).

they are generally called Squirrels or Flying Squirrels. They are nearly allied to the Phalangers (q.v.), which they particularly resemble in dentition, but have not the tail so long and prehensile, while they are distinguished by a hairy membrane or fold of the skin extending along the

FLYING SQUID—FLYING SQUIRREL.

flanks, and used as a parachute to enable them to leap to great distances. This membrane extends along both fore and hind legs almost to the toes, but does not appear behind the hind legs, nor include the tail, which is long and bushy, but which in some of them has a *distichous* character, the hair spreading out to the sides, and so rendering it useful in supporting as well as in guiding the body in the air. They are capable of modifying their course in the air, though not of true flight; and their aerial evolutions are very graceful. They repose during the day, and become active in the evening. They feed on fruits, leaves, insects, etc. A New Guinea species is about as large as a flying lemur; one of the Australian species is scarcely larger than a mouse. The fur of some of them is rich and beautiful.—PETAURIST has been proposed as an English name for this genus; but is not much used.

FLYING SQUID (*Ommastrephes*): genus of cephalopodous mollusks, allied to the Calamaries (q.v.) or squids, but differing from them in having the eyes exposed and not covered with skin, the fins united into one as a tail, and the *gladius* or bone furnished with three diverging ribs and a hollow conical appendage. The tail is large, and the power of locomotion great, so that these mollusks not only pass rapidly through the water, but leap out of it, and high enough sometimes to fall upon the decks of ships. They form a principal part of the food of many of the *Cetacea*, and are often the prey of albatrosses, petrels, and other marine birds. They are used as bait for cod in the Newfoundland fisheries.

FLYING SQUIRREL (*Pteromys*): name given to a considerable number of species of the Squirrel family (*Sciuridae*), which have a fold of the skin of the flanks extended between the fore and hind legs, and partly supported by bony processes of the feet, by means of which they are enabled to take extraordinary leaps, gliding for a great distance through the air. The tail also aids to support them in the air, as well as to direct their motion, its hairs extending laterally 'in a sort of feathery expansion.' The dentition is similar to that of true squirrels, with which also the habits generally correspond. One species (*P. Sibiricus*) is found in the north of Europe and of Asia; several species are natives of N. America, and others inhabit the s.e. of Asia and the Indian Archipelago. The European species is about the size of a rat, grayish-ash color above, white below, the tail only half the length of the body; it lives solitarily in the forests. Its fur is of little value, but the skins are sometimes mixed with those of the gray squirrel, to impose on the purchaser. The most common N. American species (*P. volucella*), abundant from the Gulf of Mexico to Upper Canada, is fully five inches long, with a tail of five inches additional, fur included. It is of a brownish-gray color above, white beneath; a black line surrounds the orbit of each eye. All the species inhabit woods, and the night is their time of activity. They feed not only on nuts and young shoots of trees, but also on

FLY-WHEEL.

small birds. They are extremely easy of domestication, and are very playful and graceful.

In gliding from tree to tree, the common American F. S. descends obliquely and with very rapid motion until near



Flying Squirrel (*Pteromys volucella*).

the tree which it seeks to reach, when it wheels upward, and alights at about a third of the height which it was from the ground on the tree which it left, the distance between the trees being perhaps 50 feet.

FLY'-WHEEL: large heavy wheel applied to a steam-engine or other machinery in order to equalize the effect of the moving power. Its action depends on the principle, that a body once set in motion retains a certain amount of moving force or *momentum*. This increases with the weight of the body and the velocity of its motion, and may be expressed relatively by multiplying the weight by the velocity; or, stated otherwise, the force required to destroy the motion of a body is equal to that which sets it in motion. Thus, a heavy wheel becomes a sort of reservoir of force, when set in motion.

There are two principal cases in which the F.-W. is commonly applied: first, when the motive power is intermittent or irregular; and, second, when the resistance or work to be done is intermittent or irregular. The crank is a good example of the first case. If the force be applied only downward, as in the common foot-lathe, it will be intermittent, and the crank must rise independently of the prime mover. This is effected by applying a F.-W. set in motion by the descending pressure of the foot acting on it through the crank; and the momentum it has thus acquired lifts the crank again to the point where it can be acted upon by the foot. It also carries the crank over the *dead points* (see

FO—FOBES.

CRANK), where even a double action of pulling and pressing would be ineffective. The case of a steam-engine turning a long shaft which passes through several workshops, and, by means of bands, drives a number of lathes, punching, drilling, planing machines, etc., is a common example of the second case, the resistance, or work to be done, being very variable from one moment to another. In such work as that of a punching-machine, the engine need not be nearly of sufficient power to directly force the punch through the metal, and yet, by the aid of the F.-W., it may do it; for, while the punch is rising, the engine is communicating momentum to the F.-W. and, when the descending punch meets with the resistance that it has to overcome, this reserved momentum is added to the direct power of the engine, the punch is forced through, and the speed of the F.-W. slackened in proportion to the resistance. The principle of the F.-W. is sometimes applied in other forms than that of a wheel, as in the hand coining-press, where a heavy ball is fixed at each end of a long lever, which is made to swing round with considerable velocity, and the accumulated momentum is concentrated upon the blow.

FO: see **BUDDHA**.

FOAL, n. *fōl* [Goth. *fula*; Icel. *foli*; Ger. *fohlen*; W. *ebol*, a young horse]: the young of the horse kind, or of an ass; a colt or filly: **V.** to bring forth young, used of the horse kind. **FOAL'ING**, imp. **FOALED**, pp. *fōld*.

FOAM, n. *fōm* [AS. *fam*; Ger. *faum*; Dut. *broem*, scum, foam]: the white substance formed on the surface of bodies of water by agitation, as the foam of the sea, or at a cataract; the substance formed on the surface of liquors by agitation or fermentation—*froth* is strictly applicable to smaller bodies of liquids: **V.** to throw out froth in a rage or in a fit; to be in a rage; to froth. **FOAM'ING**, imp.: **ADJ.** frothing; fuming. **FOAMED**, pp. *fōmd*. **FOAM'INGLY**, ad. *-lī*. **FOAMY**, a. *fōm'ī*, abounding in foam. **FOAM'LESS**, a.

FOB, n. *fōb* [prov. Ger. *fuppe*, a pocket: Gael. *faob*, a projection, as made by the watch in the pocket]: a little pocket, as for a watch; a kind of watch-guard.

FOB, v. *fōb* [Ger. *foppen*, to banter: Norw. *fubba*, to move to and fro]: to cheat; to trick; to delude with a trick. **FOB'ING**, imp. **FOBBED**, pp. *fōbd*.

FOBES, *fōbz*, **PEREZ**, LL.D.: 1742, Sep. 21—1812, Feb. 23; b. Bridgewater, Mass.: educator. He graduated at Harvard College 1762, and after teaching some time studied theology and was ordained pastor of the Congl. Church in Raynham, Mass., 1766. He served as army chaplain 1777, was elected vice-pres. of Brown Univ. and prof. of natural philosophy 1786, became a fellow of the Univ. 1795, and supervisor of Bristol Acad. 1796. He published *Sermon on the Death of Pres. Manning*; *Election Sermon*; *Topographical Description of Raynham, with its History*; *Scripture Catechism*; and sermons preached to the legislatures of Mass. and R. I. He received the degree LL.D. from Brown Univ. 1792.

FOCAL—FODDER.

FOCAL: see under **Focus**.

FOCHABERS, *fööh'a-bérz* (of old *Fochobyr*, and still locally styled *Fochaber*): small, neat village and burgh of barony picturesquely situated on the right bank of the Spey, in Morayshire, Scotland. The parish church stood formerly at Bellie, in Banffshire, about two m. nearer Speymouth, and in the immediate neighborhood of an old encampment, supposed the Tuessis of Ptolemy. Gordon Castle, the old 'Bog of Gight,' formerly seat of the Duke of Gordon, now of the Duke of Richmond, stands between F. and the Spey. Pop. (1881) 1,189.

FOCIM'ETER: see **CLAUDET'S FOCIMETER**.

FOCUS, n. *fö'kü's*, **FO'CUSES**, -*ëz*, or **FOCI**, n. plu. *fö'si* [*L. focus*, a fire, the hearth—*lit.*, a centre of fire]: the point in which rays of light or heat meet; any central point; certain points in an ellipse, parabola, and hyperbola, are called foci (see these titles). *Foccus*, in *optics*, is a point in which several rays meet and are collected after being reflected or refracted; a *virtual focus* is a point from which rays tend after reflection or refraction: the principal focus is the focus of parallel rays after reflection or refraction: see **LENS**: **MIRROR**: **CATOPTRICS**: **DIOPTRIC**: **V.** to bring to a focus or to a centre. **FOCIMETER**, n. *fö-sim'ë-tër* [*Gr. metron*, a measure]: instrument for assisting in focusing an object in or before a camera; consisting usually of a lens of small magnifying power. **FO'CUSING**, imp. **FOCUSED**, pp. *fö'küst*. **FOCUSING-GLASS**, glass used for magnifying the image on the ground glass in the camera, to enable the operator to set it into better focus. **FO'CAL**, a. -*käl* [*F.—L.*]: pertaining to a focus.

FODDER, n. *föd'dër* [*AS. foder*; *Icel. fothr*; *Dut. voeder*, victuals, food: mid. *L. fodrum*, a demand for provisions for man and horse, as by an army: *Gael. fodar*, food for cattle]: food for horses, etc., generally dry, as hay or corn: **V.** to feed with dry food. **FOD'DERING**, imp. **FODDERED**, pp. -*dërd*.

FODDER, n. *föd'dër*, or **FOTH'ER**, *föth'ër*, and **FUD'DER** [*AS. fother*, a kind of cart, a load]: a weight by which metals are sold, varying from about 19 to 25 cwt.

FODDER: food material supplied by man to domestic herbivorous animals. It embraces a large variety of herbaceous plants, many of which are extensively cultivated. Of these, the ordinary grasses and cereals are produced in the largest quantities. In England, more than 200 varieties of grass are cultivated, but in this country the number is much less, and of those grown for hay very few are universally popular. F. plants vary greatly in value and in the ease and profit with which they can be cultivated. Much depends also on the degree of maturity which they are allowed to reach, and the care with which they are cured. (See **HAY**). Besides the plants commonly termed grasses, several varieties of millet are dried for F., as are also the stalks and leaves of Indian corn. The various grains, as corn, oats, and rye, are largely used, and the straw of a few of the cereals is utilized for F. to a limited

FODDER.

extent. Of the several leguminous plants grown for F., clover is by far the most valuable and the most extensively grown, though the pea, bean, and lupine are cultivated in various localities. Root crops for F. are regarded as indispensable in England, but, on account of the labor required in growing and feeding them, are in comparatively little favor here. The principal roots cultivated in this country are the beet, carrot, and turnip. The small and inferior tubers of the potato are much used for F., and the parsnip is grown for this purpose to a limited extent. In countries where forests abound and herbage is scanty, also where agriculture is poorly developed, the leaves and twigs of trees are a standard article of F.

The value of any substance for F. depends on the quantities of albuminoids, carbo-hydrates, and fat which it contains in a digestible condition, in connection with a proper proportion of indigestible fibre to give it the requisite bulk. Too large a proportion of either of these substances makes an unbalanced ration, and, as most articles of F. are imperfect in this respect, the mixing of different substances gives better results than a single substance. Too much fibre makes an indigestible and innutritious ration, while too highly concentrated food causes indigestion and various inflammatory diseases. The proper proportion of the nutritive elements is modified, however, by the purpose for which the animal is kept—whether for work, fattening, or the production of milk. The value to the farmer of any material for F. depends not only on its nutritive qualities, but to a considerable extent also upon the facility and cheapness with which it can be grown and secured.

GREEN FODDER.—Most of the substances dried for F. are used also in a green state. When preserved in this condition for winter use, the material is called ensilage (q.v.). The system of supplying green F. to cattle at the barn in summer is called soiling (q.v.). On many farms pasturing and soiling are combined, the green F. being used to supplement the pastures when, from drought or approaching maturity of the grass, the feed therein becomes insufficient in quantity or inferior in quality. Of the crops used for green F., Indian corn (q.v.) is one of the cheapest and best. It is probably grown on a greater number of farms than any other, and in larger quantities than all others combined. It is easily produced, and on rich land yields immense crops. Rye is sown to a considerable extent; several varieties of millet and clover also are among the principal crops grown for this purpose.

The method of growing crops for green F. varies little from that adopted when they are to be used in a dry state. The preparation of the land must be as thorough, and fertilizers should be as freely applied. Rye is sown early in the autumn and is cut as needed in the spring. It remains good until the heads are beginning to form. Corn is usually grown in drills, in which it is planted much more closely than when grown for grain. It is also planted at intervals to form a succession, and the later plantings can be made upon land from which the first cuttings of rye are made.

FODDER—FÆTOR.

Grass, clover, and millet are to be cut when sufficiently grown, and any surplus can be easily and profitably cured for winter use. Where land is expensive, the use of green F. in summer is more economical than pasturage. More animals can be maintained on a given area, and much larger quantities of manure can be saved. Even where land is cheap, there are manifest advantages in adding green F. to the grass obtained in pastures. This course is specially indicated in the case of cows kept for dairy purposes.

FOD'DER, in Law: statute or custom as to disposal of fodder on a rented farm; important in Britain, where farms are mostly rented from large proprietors, but with little application in the United States. It is generally implied in the rules of good husbandry that the hay and straw produced by the farm shall be consumed on it. In England, 'in the absence of any agreement respecting the removal of hay and straw, the right to do so is regulated by the custom of the country.'—Woodfall, p. 537. The custom differs not only in different counties, but in different parts of the same county. Where the outgoing tenant leaves fodder on the premises, he is entitled to no compensation, except under an express stipulation.

FOE, n. *fō* [AS. *fah*, or *fá*, an enemy—from *fian*, to hate; Goth. *fijan*; Icel. *fja*, to hate (see FEUD)]: an enemy; an adversary; an ill-wisher. FOE'MAN, n. an enemy in war.

FÆNUS, n. *fē'nūs* [L. that which is produced, interest on money]: in *entom.*, a genus of pupivorous Hymenoptera, family *Evaniade*. The ovipositor so slightly projects that it is like a sting. The larvæ are predatory on those of other insects. The perfect fœni frequent flowers. At night or during inclement days they hang by their mandibles to the stems of different plants.

FÆTOR, n. *fē'tōr* [L.]: a strong offensive smell.

FŒTUS.

FŒTUS, n. *fē'tūs* [L. *fœtus*, filled with young, pregnant: It. *feto*, the embryo]: the young of animals in the womb or in the egg after assuming a perfect form; an embryo. **FŒ'TAL**, a. -*tāl*, pertaining to. **FŒTATION**, n. -*tā'shūn*, the formation of a fœtus.

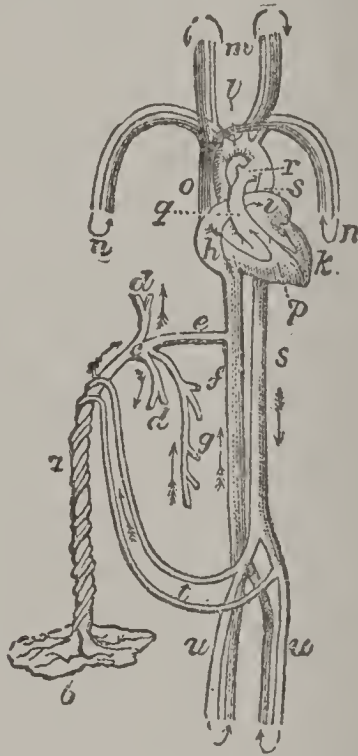
FŒTUS: the mammalian embryo, especially in its more advanced stages. In the human subject, the embryo at and after the end of the fourth month is termed a fœtus.

There are several points in relation to the F. of great interest to the physiologist and to the medical jurist. In medico-legal inquiries it is frequently of great importance to ascertain the *age* of the F.; and to facilitate such determination, the physical characters which it presents at different ages have been carefully noted and described.--In the F. of nine months—the full term—the length is 17 to 21 inches; weight 5 to 9 lbs., average about $6\frac{1}{2}$ lbs. Even at birth, the average length and weight of the male infant slightly exceeds that of the female. From numerous observations by Quetelet, it appears that there is an average excess of length of 4·8 lines, and of weight of 12 oz., in the male infant. The average weight of infants, without regard to sex, was found by a French observer, Chaussier (who noted the weight in more than 20,000 cases), to be about 6·7 lbs.--the maximum 11·3, the minimum 3·2 lbs. From the inquiries of Dr. Joseph Clark (*Philosophical Transactions*, LXXVI.) relative to 60 males and 60 females, the average in Britain seems rather higher, the weight of males being 7 lbs. 6 oz., and of females nearly 6 lbs. 12 oz.; and Sir James Y. Simpson arrived at very nearly the same result. Clark observes that if, at the full time, the weight of the infant is less than 5 lbs., it rarely thrives. Various instances are recorded of infants in which the weight at birth has exceeded twice the average weight. Thus a case is recorded by Mr. Owen, in the *Lancet* 1838, in which the child at delivery weighed 17 lbs. 12 oz., and was 24 inches in length; and in the *Medico-Chir. Review*, 1841 Oct., there is the mention of a case in which the weight was nearly 18 pounds.

In certain points the F. at the full period differs anatomically from the child shortly after birth. The bony skeleton is very incomplete, cartilage occurring in the place of many bones. Indeed, complete ossification (viz., of the vertebræ) is not finished until about the 25th year, and the only bones completely ossified at birth are the minute ossicles of the ear. The difference between the F. and the child in this respect is, however, one only of degree. During pregnancy, a temporary organ, the placenta (popularly known as the after-birth, from its being thrown off shortly after the birth of the child), is developed on the inner wall of the uterus (see *b* in the figure). This organ is composed mainly of vessels, and there proceeds from it the structure known as the umbilical cord, *a*, in which lie the umbilical vein, which conveys arterial blood to the F., and the two umbilical arteries, which return the blood to the placenta. This umbilical cord conveys these vessels to the umbilicus, or navel. Before tracing the course of the blood through the F., we must notice the chief anatomical peculiarities

FŒTUS.

presented by the vascular or circulating system before birth.—1. In the heart, is a communication between the two auricles by an opening termed the *foramen ovale*. 2. In the arterial system, are (first) the *ductus arteriosus* (see *r* in the figure), a large communicating trunk between the pulmonary artery and the descending aorta; (secondly) the branches given off by the internal iliac arteries—which have the name of hypogastric as long as they are within the body of the F., and of umbilical when they enter into the structure of the cord—which are continued from the F.



The Foetal Circulation (from Wilson's *Anatomist's Vade Mecum*)
a, the umbilical cord proceeding from *b*, the placenta; *c*, the umbilical vein; *d, d*, its branches going to the liver; *e*, the *ductus venosus*; *f*, the inferior vena cava; *g*, the portal vein; *h*, the right auricle. The uppermost arrow indicates the course of the blood through the *foramen ovale*. *i*, the left auricle; *k*, the left ventricle. The arrow commencing in the left ventricle, and with its head on the ascending aorta, indicates the course of the blood to be distributed to the head and extremities; *l*, the arch of the aorta. The arrows *m* and *n* represent the return of the blood from the head and upper extremities, through the jugular and subclavian veins, to the superior vena cava, *o*, to the right auricle, *p*, and, as shown by the arrow, through the right ventricle, *k*, to the pulmonary artery, *q*; *r*, the *ductus arteriosus*; *s, s*, the descending aorta; *t*, the hypogastric or umbilical arteries; *u, u*, the external iliac arteries.

to the placenta, to which they return the blood that has circulated in the foetal system. 3. In the venous system is a communication between the umbilical vein and the inferior vena cava, called the *ductus venosus*.

Pure blood is brought from the placenta by the umbilical vein, which passes through the umbilicus, and enters the liver, where it divides into several branches, *d, d*, distributed to that viscus—the main trunk or *ductus venosus*, *e*, passing directly backward, and entering the inferior vena cava *f*. The pure blood here becomes mixed with the impure blood returned from the lower extremities and abdomi-

nal viscera, and is carried into the right auricle, *h*, and thence, guided by the Eustachian valve (which is between the anterior margin of the inferior cava, and the auriculo-ventricular orifice, and is of relatively large size in the F.), passes through the *foramen ovale*, into the left auricle, *i*. From the left auricle, it passes into the left ventricle, and into the aorta, whence it is distributed by the carotid and subclavian arteries principally to the head and upper extremities, which thus receive comparatively pure blood. From the head and arms, the impure blood is returned by the superior vena cava to the right auricle; from the right auricle, it is propelled, as in the adult, into the right ventricle; and from the right ventricle, into the pulmonary artery. In the child, it would now pass through the lungs, and be oxygenized; but in the F. it passes through the *ductus arteriosus* into the commencement of the descending aorta, where it mixes with that portion of the pure blood not sent through the carotid and subclavian arteries. Some of this mixed blood is distributed by the external iliac arteries, *u, u*, to the lower extremities, while the remainder (probably the larger portion) is conveyed by the hypogastric or umbilical arteries, *t*, to the placenta.

From the above description it is seen—1. That a considerable quantity of the pure blood from the placenta is at once distributed to the liver, which accounts for its large size at birth as compared with the other viscera. 2. That a double current meets in the right auricle, one stream, guided by the Eustachian valve, passing through the *foramen ovale* into the left auricle, the other through the auriculo-ventricular opening into the right ventricle. 3. That the comparatively pure blood sent to the head and arms, as contrasted with the impure blood sent to the lower extremities, causes the relatively greater development of the former organs, and prepares them for the functions that they are called upon to perform; the development of the legs at birth being slight as compared with that of the head or arms.—Almost immediately after birth, the *foramen ovale* becomes closed by a membranous layer, and the *ductus arteriosus* and *ductus venosus* degenerate into imperious fibrous cords. The lungs, previously to the act of inspiration, are dense and solid in structure, and of deep-red color, and lie far back in the chest. Their specific gravity is greater than water, in which they (or portions of them) consequently sink, whereas lungs, or portions of lungs, that have respired, float in that fluid.

The full period of foetal existence is stated in general as *nine months*. The period of gestation is, however, constant only between certain limits, and it is of the greatest importance in questions of chastity and legitimacy to determine these limits.—The average duration of gestation in the human female is comprised between the 38th and 40th weeks after conception. It is comparatively seldom that the actual date of conception can be fixed with positive certainty; but among the few cases of this kind on record, Rigby mentions one in which natural labor came on in 260 days, and Reid mentions another in which it did not

commence until the lapse of 293 days. Here, then, is an unquestionable range of 33 days; and many apparently authentic cases are on record in which a longer period of gestation than in Reid's case has been observed. Another important question is—What is the earliest period at which a child can be born, to enable it to live, and to continue in life after its birth? There is no doubt that children born at the seventh month of gestation are capable of living, though they usually require much care; and children may be born alive at any period between the sixth and seventh months, or even in some instances earlier than the sixth; but this is rare, and if born living, they commonly die soon after birth. Various cases of this nature are collected by Dr. Taylor in his *Medical Jurisprudence*; among them a case reported by Dr. Barker of Dumfries, in which a child was born at the 158th day of gestation, and (though small) grew up. In the celebrated Kinghorn case, the child was born 174 days or nearly six calendar months after marriage, and lived more than eight months; and the majority of the medical witnesses who gave evidence on that occasion were strongly in favor of the view that the period of the gestation was circumscribed by the period of wedlock.

Questions connected with prolonged gestation have given rise to much discussion in legal medicine. No period has been fixed by law beyond which a child if born in wedlock is to be declared illegitimate. In the case of *Anderton v. Gibbs*, 1834, the vice-chancellor decided that a child born ten months or about 42 weeks after intercourse with the husband, was legitimate. In the *Gardner Peerage* case, which came before the house of lords 1825, the question was, whether a child born 311 days (44 weeks and 3 days) after intercourse, could be legitimate. Lord and Lady Gardner separated 1802, Jan. 30, and did not again meet till July 11. A full-sized child was born Dec. 8 of that year. The principal obstetric practitioners in the kingdom were examined on this point, and a large majority concurred in the opinion that natural gestation might be protracted to such a period. The decision, which was against the legitimacy, seems to have been based mainly if not entirely on the moral grounds that Lady Gardner, after separating from her husband, was living in open adultery. In the case of *Commonwealth v. Porter* (see *American Journal of Medical Science*, 1845), it was decided in the United States that a child born 317 days (or 45 weeks and 2 days) after conception was legitimate. In the case of *Cotterall v. Cotterall*, decided in the consistory court 1847, the husband had proceeded against his wife for a divorce on the ground of adultery. In this case, if it were the child of the husband, it must have been born after 12 months' gestation. Dr. Lushington, without entering into the question of protracted gestation, at once pronounced for the divorce, such a duration of pregnancy not being supported by any known facts.

The question is important—What constitutes live-birth? This is a point on which the most distinguished obstet-

ric authorities have differed: some holding that where there is muscular movement, there is life: while others maintain that where respiration has not been proved to have taken place, the child was still-born. Among the most celebrated law-suits on this point, we may mention that of *Fish v. Palmer*, 1806, and that of *Brook v. Kellock*, in 1861. In the last-named case it was decided by the vice-chancellor, Sir J. Stuart, that a child may live for some time after birth, and not breathe, the absence of signs of breathing being held to be no proof of its being born dead. It was given in evidence that there was pulsation of the funis after separation of the cord, and the beating of the heart was regarded as proof of live-birth. Hence it is now established in English law, that respiration is not required to establish live-birth; and the laws of France and of the United States do not require that the child shall have breathed. In Scotland, the law requires not only that the child shall have breathed, but that it shall have cried; and in conformity with this law, a child which lived, breathed, and died in convulsions at the end of half an hour, was declared to have been born dead (*Dyer's Reports*, 25).

FOG, n. *fög*, or FOG'GAGE, n. *-gāj* [mid. L. *fogagiūm*, winter pasture: Swiss, *fasch*, thick tangled grass]: after-grass; grass not eaten down in the summer that grows in tufts over the winter; in *Scot.* the mosses found in pasture-lands, etc. FOGGY-BEE, the carder bee, *Bombus muscorum*, which makes its nest in moss.

FOG, v. *fög* [Ger. *fug*, convenience, opportunity: Gael. *fogaí*, chase, hunt]: in *OE.*, to resort to mean expedients; to make shifts. FOG'GING, imp. FOGGED, pp. *fögd*. FOGGER, n. *fög'gér*, one mean and shifty in the pursuit of legal business, as in *pettifogger*, which see.

FOG, n. *fög* [Dan. *fog* in *sneefog*, a snowstorm—from *fyge*, to drive with the wind: prov. Dan. *fuge*, to rain fine and blow: Icel. *fok*, flight of things driven by the wind]. visible watery vapor floating near the surface of the earth; a thick mist. FOG'GY, a. *-gĩ*, cloudy; misty; dull. FOG'GILY, ad. *-lĩ*. FOG'GINESS, n. state of being foggy; cloudiness. FOG-BANK, an appearance at sea in hazy weather resembling land at a distance, caused by fog.—*Fog* is caused, as clouds are, by the precipitation of the moisture of the atmosphere. This takes place when a stratum of atmosphere comes in contact with a colder stratum, or with a portion of the earth's surface, as a hill, by which it is cooled, so that it can no longer hold in solution so much moisture as before. It takes place also when a cold stratum of atmosphere comes above a moist warm portion of the earth's surface, the exhalations from which are precipitated and become visible as they ascend into it. Thus, fogs are formed over lakes, rivers, and marshes in the evening, because the water is then warmer than the atmosphere above it. The fogs seen in the morning often disappear by being dissolved in the atmosphere as the temperature increases. The fogs on the coasts of New England and Nova Scotia are caused by bodies of warm moist air wafted over the water of the cold

- FOGARAS—FOGGIA.

southward current from the Arctic seas through Baffin's Bay.

In the thick yellow fog notorious as London fog, the watery particles are largely mingled with smoke and other impurities. It has been found that these fogs are not merely a serious hindrance to traffic in London, but are distinctly detrimental to health. During the great fog of 1879-80, remarkable for density and long continuance, the death-rate for several kinds of disease was very markedly increased. The only remedies proposed for the diminution of the smoky elements of fog are more complete consumption of smoke in factory furnaces, and the use in dwelling-houses of smokeless grates or stoves.—In 1880, Dr. Aitken propounded to the Royal Soc. of Edinburgh a theory (partially anticipated by a Dutch investigator 1876) that pure vapor is naturally invisible, and becomes visible as cloud, mist, or fog, only after condensation around the dusty particles in the atmosphere. The dust meant includes of course not merely the grosser kinds, but also many almost impalpable powders; such, for example, as the results of the combustion by a meteorite in the upper air. But for *some* kinds of dust present in the atmosphere, there would, according to this theory, be no visible fog at all, even when the air was charged with watery moisture.

FOGARAS, *fō-gōh-rōsh'*: co. of Austria, in Transylvania, on the Wallachian frontier, between the co. of Cronstadt on the e. and Hermannstadt on the w. The climate is cold and the surface of the country mostly mountainous. Cattle-breeding is extensively carried on, but no considerable agriculture. Prior to 1876 the co. was a district with a pop. (1870) of 82,852, chiefly Wallachians with some Saxons and Hungarians.—The cap. Fogaras, is a fortified town on the left bank of the Aluta river, 55 m. e. of Hermannstadt. It has a Franciscan monastery, and is the see of a Cath. abp. of the Romanean rite. Pop., co. 86,943; cap. 5,307.

FOGARASY, *fō'gōh-rōsh-e*, JANOS (JOHN): 1801-78; b. Kásmárk, co. of Abanj, Hungary: philologist and jurisconsult. His publications in both departments rank as standard works: among them are—*Latin-Magyar Lexicon for Legislation and Government* (2d ed. 1835); *Metaphysics of the Magyar Tongue* (1834); *Magyar-German Dictionary* (1836); *Commercial Law of Hungary* (1840); *Essays on the Spirit of the Hungarian Language* (1845).

FOG'GIA: province of Italy: see CAPITANATA.

FOGGIA, *fōd'já*: town of Italy, cap. of the province of F. (formerly Capitanata), s. Italy; between the rivers Cervaro and Celone, in a district abounding in plantations of olives, vines, and other fruit trees, 80 m. e.n.e. of Naples. It is a handsome, well-built town, with spacious streets, good houses, and large shops. Among the chief buildings are the cathedral, a Gothic edifice originally, but partially destroyed by earthquake 1731, and rebuilt in a different style; numerous churches, some of them antique; the custom-house, a beautiful building; and the theatre. It is the centre of all the trade of the province, and has many large

FOGO—FOG SIGNALS.

corn magazines. F., supposed to have been built from the ruins of the ancient Arpi, was a favorite residence of Emperor Frederick II., and here died his wife Isabella, dau. of the English king, John. It was also for some time the residence of Ferdinand I. and his court, when it ranked as the second city in the kingdom. Pop. (1891) 44,000; (1901) 53,151.

FOGO, *fō'gō*, or FUEGO, *fwā'gō*: island of the **Ca** Verde group, in the Atlantic Ocean, 320 m. w. of Cape Verde, Africa. It is nearly circular in shape, has a circumference of 40 m., and consists of a volcanic mountain towering 9,157 ft. above sea level. The climate is dry, soil very fertile, producing grain, wine, fruits, and tobacco. There have been occasional volcanic eruptions since 1860, and numerous droughts; during one (1730-34) two-thirds of the inhabitants died. Port. Nossa Senhora da Luz Pop. of F. (1830) 17,000; (1900) about 18,000.

FOG' SIG'NALS: audible warnings used on board ships, on the sea-coast, or on railways, during fogs and mists, or at any other time when lights or ordinary daylight-signals are not available. The commonest fog-signal on ship-board is the continuous ringing of the ordinary time-bell, or striking the anchor with a hammer, with occasional discharge of musketry and heavy guns. These are adopted to prevent collisions, when ships are overtaken by a fog in places where shipping is abundant. The blowing of a horn, the beating of a drum, of an empty cask, or of a gong, and various other unusual sounds, are also adopted. Steam-vessels generally blow a whistle under these circumstances. These sounds, however, indicate only in general the position of the ship, and not the direction in which she is sailing. Many plans have been devised for a code of signals, by which the directions n., s., etc., might be indicated by the varying length of each sound, or the intervals between the sounds of a fog-horn or whistle. Some general code of signals of this kind is very desirable for the merchant service as well as the navy; and its recognition by the marine of all nations should be procured. Some navies have such a code for the direction of a fleet of ships of war in thick weather.—See SIGNALS. Fog-signals from the shore are very helpful, especially on a dangerous coast. Bells and guns have been used for the purpose, but when a strong wind is blowing in toward the shore, their sound is heard only a very little distance out at sea. Consequently steam-whistles and fog-horns sounded by compressed air, are being used in their stead. Fog-sirens, (or siren-trumpets, for the mode of producing whose sound, see SIRENE), are now largely in use. In 1880, nearly 40 had been established on the coast of England and Wales (at a cost of \$250,000): these are audible at a distance of two to ten miles. In the United States, the Daboll trumpet, operated by air condensed in a caloric engine, is much used.—Unfortunately, all sound-signals are liable to modification from various disturbing causes, such as wind, moisture, and temperature.

FOGY—FOIL.

Fog-signals used on railways are small cases charged with detonating powder, and laid upon the rails. They explode loudly when the wheel of an advancing train comes upon them. They are used, not only in fogs, but in all cases of danger from obstruction of the line, or in any urgent need of stopping a train immediately. Station-masters and railway police are furnished with them.

FOGY, or FOGEX, or FOGIE, n. *fō'gĩ* [Dan. *fjog*, a dull person: Gael. *fogair*, to banish]: *colloquially*, a stupid old man; an elderly person who has no sympathy with the amusements and pursuits of the young; applied to old soldiers when embodied for drill or garrison duty. FOGYISM, the manner, habits, or characteristics of a foggy.

FOHN, n. *fōn* [L. *fāvōniūs*, the west wind]: the Swiss name for the hot southerly winds of summer.

FÖHR, *fēr*: island in the North Sea, on the w. coast of Schleswig; about 28 sq. m. It is divided into *Osterlandfohr* which always belonged to Schleswig, and *Westerlandfohr* ceded by Denmark to Schleswig 1864. The inhabitants are mostly Frisians. The chief place is Wyk (pop. 1,000). Pop. of island, abt. 4,150.

FOIBLE, n. *foy'bl* [F. *foible*, weak]: a weak point in character; a moral weakness or infirmity; a failing.—SYN.: fault; imperfection; weakness; infirmity; defect; frailty.

FOIL, v. *foyl* [F. *fouler*, to press, to tread—from It. *follare*—from mid. L. *fullārē*, to full cloth: F. *affoler*, to spoil, to befool—from *fol*, a fool]: to frustrate; to defeat; to baffle; to render unavailing: N. defeat; frustration. FOIL'ING, imp. defeating; frustrating. FOILED, pp. *foyld*. FOIL'ER, n. one who.

FOIL, n. *foyl* [F. *refoulé*, dulled, blunted: Gael. *foil*, gentle, soft]: blunted weapon, a thin bar of elastic steel, mounted as a rapier (q.v.), with a leather-covered button on its end, used in fencing or in learning the sword exercise: see FENCING.

FOIL, n. *foyl* [F. *feuille*—from *fōlūm*, a leaf]: general name for thin metal intermediate in thickness between *leaf-metal*, such as gold, silver, and copper leaf, and *sheet-metal*. Two kinds are in common use—the tin-F. for silvering looking-glasses, lining tea-caddies, and similar purposes, and for the conducting coatings of electrical apparatus; and the bright foils employed by jewellers for backing real or artificial gems, thereby increasing their lustre or modifying their color. The tin-F. is made by rolling out tin, or, recently, by the method of Mr. Wimshurst, who casts a cylinder of the metal, and then, by means of a knife or cutter, shaves it into a sheet as the cylinder rolls to the knife, which is gradually moved inward toward the axis of the cylinder at a rate proportionate to the required thickness of the sheet.

The bright F. used by jewellers and for theatrical and other ornaments under the name of 'tinsel,' is made of copper, tin, tinned copper, or silvered copper. The last is now

chiefly used by jewellers. The metal is rolled in a flattening mill, and the requisite brilliancy of surface is produced by finishing between burnished rollers and polishing. The various colors are produced by coating the white metal with transparent colors mixed in isinglass size. A similar varnish without color is laid over the white F., to prevent tarnishing. The socket, or setting, in which the stone or paste is mounted is lined with the F., and by reflecting from the internal facets the light which passes through the stone, adds considerably to its brilliancy. The natural colors of real stones are sometimes heightened or modified by colored foil, and factitious colors are thus given to the glass, or 'paste,' as it is called, of which spurious gems are made. There are two other methods of foiling gems, distinct from the above: one of them is to line the socket of the setting with tin-F., then fill it while warm with mercury; after a few minutes the fluid mercury is poured out, and there remains an amalgam of tin, precisely the same as is used for backing common mirrors; the gem is fitted into this, and and thus its back has a mirror surface. The other method is to precipitate a film of pure metallic silver upon the back of the stone, by submitting a solution of the ammonia nitrate of silver in contact with the stone to the reducing action of the oils of cassia and cloves. The silvering of looking-glasses being the chief use to which the ordinary *tin-foil* is applied, its purity is a matter of great consideration; its employment also by chemists, as a ready means of forming some of the tin compounds, renders this absolutely necessary. Nevertheless, the spirit of adulteration has infected the tin-F. makers, and lead has been extensively alloyed with the tin. In some analyses recently made, it has been shown that as much as 85 per cent. of the adulterant metal has been used, the effect of which in the process of silvering mirrors is most injurious to the brilliancy of the amalgam, which should consist of perfectly pure tin and quicksilver. For chemical purposes, it is now absolutely necessary to test for lead before using *tin-foil*.

The foils used by jewellers for backing gems, consisting of small sheets of silvered copper rolled very thin, are colored with the following preparations to suit the different gems under which they are to be placed, or for use as tinsel in the manufacture of theatrical ornaments, toys, etc.: Lake and Prussian blue, and pale drying-oil, finely ground with a slab and muller—for *amethyst* color. Prussian blue, similarly prepared—for *sapphire* color. Dragons' blood dissolved in pure alcohol—for *garnet* color. Sesquiferrocyanide of iron and bichromate of potash, equal parts very finely ground and sifted, then ground with a quantity of gum-mastic equal to the other two ingredients, until the whole forms an impalpable powder; this gradually formed into a thin paste with pure wood-spirit (pyroxylic) and preserved in stoppered bottle; when used, a portion is diluted with wood-spirit to the necessary thinness—for *emerald* color. Various shades of yellowish or bluish green can be produced by varying the proportions of the two coloring materials. Lake or carmine, ground in solution of isinglass

—for *ruby* color. A weak solution of orange-shellac, sometimes tinted with saffron, turmeric, or aloes—for *topaz* color. Several other color-varnishes are made by similar methods for various shades of tinsel and gem foils. See SILVERING.

FOIL, in *arch.*, is one of the small arcs in the tracery of Gothic windows, panels, etc.—so named probably as being a conventionalized leaf-form.

FOIN, v. *foyn* [OF. *foigner*, to make a feint; *fouine*, a fish-spear]: in *OE.*, to make a pass or thrust in fencing: N. a thrust or push with the sword or foil in fencing. FOIN'ING, imp. FOINED, pp. *foynd*.

FOISON, n. *foy'zn* [F. *foison*, abundance—from L. *fūsionēm*, a pouring forth—from *fusus*, poured]: in *OE.*, the natural juice or moisture of grass or herbage; the heart and strength; abundance; plenty. *Note.*—FOISON, in Scotch denotes abundance; pith; ability; essence. FOISONLESS, or FIS'SENLESS, a. destitute of substance or pith; dried; withered.

FOISSONNEMENT, n. *fwá'sõn-mǎng'* or *foy'sõn-měnt* [F. *foissonnement*, property of increasing—from *foissonner*, to increase]: in *mil.*, the increase in the bulk of earth after its excavation—a term used in fortification.

FOIST, v. *foyst* [Ger. *fist*, an ill smell: Dut. *veest*, wind from the bowels: Icel. *fysa*, to breathe, to break wind in a noiseless manner]: to introduce something surreptitiously; to insert by fraud or forgery, or without authority. FOIST'ING, imp. FOIST'ED, pp. FOISTY, a. *foyst'ĩ*, moldy; fusty. FOIST'INESS, n. fustiness; moldiness.

FOIX, *fwá*: small, unimportant town of France, dept. of Ariège, on the left bank of the river of Ariège, 44 m. s.s.e. of Toulouse. It has a picturesque old castle, with three well-preserved towers of whitish marble, all of different ages before the 15th c. It has some trade in iron, and in the vicinity are numerous ironworks. F. was cap. of the old county of *Foix*. Pop. (1881) 5,500.

FOIX: old French family, which took the title of count from the district of Foix (now the dept. of Ariège), in the s. of France. The first who bore the title was Roger, Comte de Foix, middle of the 11th c. Raymond, Comte de Foix, figures as one of the knights who accompanied King Philippe Auguste to Palestine; afterward, being accused of heresy, his estates were seized by Comte de Montfort: he d. 1223. Several members of the family subsequently distinguished themselves in the wars against England.

GASTON III., Comte de Foix (1331-91), called Phœbus, on account of the beauty of his person, was noted for knightly love of splendor and military prowess. For his services to the king, he was made gov. of Languedoc and Gaseony. When only 18 years old, he married Agnes, dau. of Philip III., King of Navarre. In 1358, during the insurrection known as the *Jacquerie* (q. v.), he delivered the royal family from the power of the rebels. When Charles VI. wished to deprive him of the government of Languedoc, he maintained his position by force of arms, and defeated the



Fontange.—From a French Print of the Period.



Follicle of Columbine (*Aquilegia vulgaris*). Foramen.



Font with Cover, St. Gregory's, Sudbury.



Bones of the Foot and Ankle: *a*, Tibia; *b*, Fibula; *c*, Astragalus; *d*, Os calcis, or heel-bone; *e*, Scaphoid bone; *f*, *g*, *h*, The internal, middle, and external cuneiform bones; *i*, Cuboid bone.

FO-KIEN—FOLCLAND.

Duc de Berri in the plain of Revel. He was inordinately attached to the chase, and is said to have kept 1,600 dogs. He wrote a work on the subject, entitled *Miroir de Phébus des deduits de la Chasse des Bestes sauvages et des Oyseauix de Proye*, which went through several editions in the 16th and 17th c., and whose bombastic style (*faire du Phébus*) became a byword. Froissart owed some of the choicest incidents in his history to having lived for some time in the castle of Orthes, Gaston's principal residence. After his death, the estates and title went to a collateral branch of the family.

GASTON IV., Comte de Foix, rendered good service to the king in the wars against England. In 1455, his father-in-law, John II., King of Navarre, named him his successor. In addition to this, Charles VII. created him a peer of France, and ceded to him his claims on Roussillon and Cerdagne. He died 1472, when the family possessions were again divided.

GASTON DE FOIX, (1489-1512, Apr. 11), grandson of Gaston IV., and son of Jean de F., Comte d'Estampes, and of Marie d'Orleans, sister of Louis XII. of France—last and probably most heroic member of the family. In 1507, he received from his uncle, the French king, the title of Duc de Nemours. In the Italian wars carried on by Louis, Gaston displayed the most brilliant and precocious genius. He twice overthrew the Swiss, at Como and Milan; chased Pope Julius II. from Bologna; seized Brescia out of the hands of the Venetians; and, to crown a series of splendid triumphs, which obtained for him the title of the *Thunderbolt of Italy*, won the great battle of Ravenna over the Spaniards, 1512, Apr. 11, in which, however, he fell, at the early age of 23.—On his death, the estates and title of the house of F. went to Henry, King of Navarre, whose dau., Jeanne d'Albret, married Antoine de Bourbon, Duc de Vendôme, and became mother of the great Henri Quatre, who thus attached the county of F. to the French crown.

FO-KIEN: see FUH-KEEN.

FOKTCHANY, *fōk-chá'nē*, or FOKTSHAN, *fōk-shán'*: a town of Roumania, on the Milkov, a branch of the Sereth, which divides Walachia from Moldavia. In 1789, F. was destroyed by the Russians. It was burned by the Turks 1822. The inhabitants are mostly Greeks and Jews. Pop. (1880) 20,500, (1885) 25,290.

FOLCLAND, or FOLKLAND, *fōk'länd*: land of the folk or people in England in Anglo-Saxon times. The F., according to Turner, was that portion of the kingdom retained in behalf of the public with a view to increasing population and to the growing wants of the community, and not permitted to become allodial estate or absolute private property. Of this land, the usufruct or *dominium utile* was enjoyed by the freemen, for which certain rents were paid to the state, and which did not become hereditary. The rights held in it by individuals reverted to the community at the expiry of a particular term, when it was again given out by the folcgemot, or court, of the district, either in commonalty or in severalty. Certain services to

the public were commonly imposed on the holders of F., such as the reparation of the royal vills and other public works; the exercise of hospitality to the king, and to other personages of distinction in their progresses through the country, by furnishing them and their messengers, huntsmen, hounds, hawks, and horses with food, and providing them, when necessary, with means of transport. It does not seem that the F. was held exclusively by the common people, but rather that it was open to freemen of all ranks and conditions, and that the possession of it was much coveted even by those who held great estates on the hereditary title which was known as *Boekland* (q.v.). F. was often given out as boekland to those who had performed great public services, just as Horatius was rewarded by a grant of the Roman *ager publicus*—

‘They gave him of the corn-land
That was of public right.
As much as two strong oxen
Could plow from morn till night!’

F. was also given frequently to the church, for founding monasteries and the like, a practice of which Bede complains in his celebrated letter to Abp. Egbert: ‘It is disgraceful to say, persons who have not the least claim to the monastic character, as you yourself best know, have got so many of these spots into their power, under the name of monasteries, that there is really now no place at all where the sons of nobles or veteran soldiers can receive a grant.’ —Kemble’s *Saxons*, p. 291. Kemble gives examples of the dues paid by monasteries for the F. which they held, which afford curious information as to the products of industry and modes of living of those times. In 883, a monastery is freed from all dues which the monks were still bound to pay to the king’s hand, including bright ale, beer, honey, oxen, swine, and sheep. The dues of the monastery at Taunton were: a feorm (or entertainment) of one night to the king, and eight dogs and one dogkeeper; and nine nights’ keep for the king’s falconers, and carriage, with wagons and horses, for whatever he would have taken to Curry or Wilton; and, if strangers came from other parts, they were to have guidance to the nearest royal vill on their road.

FOLD, v. *föld* [AS. *fealdan*; Goth. *falthan*; Icel. *falda*; Ger. *fallen*, to lay together, to fold: W. *ffill*, a twist]: to double; to bend one part over another: N. the doubling of any substance; a plait. FOLD’ING, imp.: ADJ. doubling; that may close over another; consisting of leaves that may close one over the other: N. a doubling. FOLD’ED, pp. FOLD’ER, n. one who.

FOLD, n. *föld* [AS. *fald*; Gael. *fal*, a circle, a penfold: W. *ffald*, a sheep-cote]: a place to confine sheep or other animals; a flock of sheep: V. to shut up or confine, as sheep in a fold. FOLD’ING, imp.: N. the keeping of sheep in inclosures. FOLD’ED, pp. FOLDAGE, n. *föld ij*, the right of folding sheep.

FÖLDVAR, or DUNA-FÖLDVAR, *dó'nöh-föld-vár*; town

of Hungary, county of Tolna, on the crest and slope of a hill on the right bank of the Danube, 48 m. s. of Pesth. It has a Rom. Cath. high-school, is a steam-boat station, has an important sturgeon-fishery, and considerable trade in wines and agricultural produce. Pop. (1881) 12,720.

FOLENGO, *fo-lén'gō*, TEOFILO (known as MERLINO COCAJO, or COCCAI): macaronic poet: 1491-1544; b. Mantua, Italy; brother of Giambattista F., monk and scholar. He was of noble family, became a Benedictine monk when 16 years old, began writing vivacious and burlesque poems in a mixed Latin and Italian dialect, and, when 25 years old, gave up monastic life and with Girolama Dieda, a young woman of good family, became a wanderer through the country, supporting himself and companion by this poetical compositions. He published a coarse poem, *Merlini Cocaii Macaronicon*, which attained wide popularity; and followed it with *Orlandino*, a work of 8 cantos and rhymed octaves. In 1526, he returned to monastic life, wrote a poem descriptive of his wanderings, then turned his attention to religious poems, and for a time had charge of a monastery in Sicily.

FOLEY, *fō'li*, JOHN HENRY, R.A.: 1818, May 24-1874, Aug. 27; b. Dublin: sculptor. He was entered as a student in the Dublin Royal Soc. when 13 years old, and, after obtaining numerous prizes, removed to London and became a student in the Royal Acad. 1834. In 1839, he made his first exhibition, and 1844, as one of the successful candidates for the contract for decorating Westminster Palace with statues, began his public work, which comprised statues of John Hampden, Selden, Sir Charles Barry, Outram, and a bronze equestrian of Lord Hardinge, which was erected in Calcutta. His later works included the statue of the prince consort and the group *Asia* for the Hyde Park national memorial, and statues of Oliver Goldsmith, Edmund Burke, and Father Matthew for Ireland, and of Gen. 'Stonewall' Jackson for the state of S. C., besides a number of ideals.

FO'LEY, THOMAS, D.D.: 1822, Mar. 6-1879, Feb. 19; b. Baltimore: Rom. Cath. bp. He was educated at St. Mary's College, Baltimore, and the theol. seminary of St. Sulpice; was ordained priest 1846, Aug. 16; was appointed to the charge of Rom. Cath. missions in Montgomery co., Md.; was two years asst. pastor of St. Patrick's Church, Washington; served 22 years in the Cathedral, Baltimore; became sec. to Abp. Kenrick 1851, chancellor of the archdiocese of Baltimore, vicar-gen. 1867, coadjutor to the bp. of Chicago 1867, and bp. 1870, Feb. 27. He was an accomplished scholar and orator, beloved by all who knew him.

FOLGER, *fōl'jēr*, CHARLES JAMES, LL.D.: 1818, Apr. 16-1884, Sep. 4; b. Nantucket, Mass.: lawyer. He graduated at Hobart College, Geneva, N. Y., 1836; was admitted to the bar 1839; appointed judge of the Ontario co. court of common pleas 1843, and master and examiner in chancery; was co. judge 1851-56; state senator 1861-69, chair-

man of the judiciary committee for the entire period, and pres. *pro tem.* four years; chairman judiciary committee of the constitutional convention 1867; asst. U. S. treas. at New York 1869-70; elected associate judge N. Y. court of appeals 1871, and appointed chief justice 1880; re-elected judge for 14 years 1880; resigned 1881 to become sec. of the U. S. treas.; and was defeated by Grover Cleveland as republican candidate for gov. of N. Y. 1882; this defeat of one so widely honored was occasioned by a bitter quarrel in the republican party of that state.

FOL'GER, PETER: 1617-1690; b. England: colonist and author. He removed from Norwich, Eng., to Watertown, Mass., 1635; settled in Martha's Vineyard 1641; taught school, surveyed, and labored as missionary among the Indians; removed to Nantucket 1663; became a Bapt. minister, and was clerk of the court. His daughter Abiah became mother of Benjamin Franklin. Among his publications was a poem, *A Looking-Glass for the Times; or the Former Spirit of New England revived in this Generation* (1675; 1763).

FOLIACEÆ, n. fō-lī-ā'sē-ē [L.]: division of *Cellulares*, or cellular plants, comprehending the foliaceous orders *Filices*, *Equisetaceæ*, *Lycopodineæ*, and *Marsilaceæ*. It was distinguished from the *Aphyllæ*, containing the Mosses Lichens, Algæ, Fungi, etc.

FOLIACEOUS, a. fō lī-ā'shūs [L. *foliācēūs*, like leaves—from *foliūm*; Gr. *phyllon*, a leaf: F. *foliacé*]: leafy; consisting of leaves; having the form of a leaf or thin plate. FOLIAGE, n. fō lī-āj [F. *feuillage*, leaves of a tree—from F. *feuille*; L. *foliūm*, a leaf]: leaves of a tree collectively; a cluster of leaves. FO'LIAGED, a. -āj'd, furnished with foliage. FO'LIATE, v. -āt [L. *foliātus*, leaved, leafy]: to beat into a leaf or thin plate; to cover with a coating, as of a metal: ADJ. leaved or having leaves. FO'LIATING, imp. FO'LIATED, pp.: ADJ. consisting of plates or thin layers; resembling a thin plate or a leaf. FO'LIA'TION, n. -ā'shūn, the leafing of plants; the act of beating metal into thin plates; leaf or foil; the manner in which the young leaves of plants are arranged in the leaf bud: in *geol.*, the plates into which certain crystalline rocks are divided; a term restricted by Darwin, and subsequently by geologists, to the alternating layers or plates of different mineralogical nature, of which gneiss and some other metamorphic schists are composed. It differs from cleavage, which is applied to the divisional planes that render a rock fissile, though to the eye it is quite or nearly homogeneous; and from lamination, which is the easy splitting of a rock into its original layers of deposition. Its cause is not determined. Some hold that as gneiss is composed of the disintegrated ingredients of granite, the layers are identical with the original laminæ, having been arranged according to their various densities. But it can scarcely be conceived that water would be able to deposit such materials in the same order over areas so immense as those occupied by gneiss strata. It seems more probable that the arrangement is due to some widespread

FOLIA MALABATHRI—FOLKES.

metamorphic and segregating force after the deposition of the beds. FOLIATE-CURVE, in *geom.*, curve of the third order, consisting of two infinite branches, with a common asymptote, which intersect each other so as to form a leaf-like branch. Its equation is $x_3 + y_3 = a, x, y$. FOLIFEROUS, a. *fō-lif'er-ūs* [L. *fērō*, I bear]: producing leaves. FOLIOUS, a. *fō'li-ūs*, leafy. FOLIOSE, a. *fō'li-ōs*, in the form of a leaf, as certain lichens. FO'LIOLE, n. -*ōl*, a leaflet.

FOLIA MALABATHRI, *fō'li-ā māl-a-bā'thrī*, i. e., Malabar Leaves: aromatic tonic, formerly in much repute as a medicine; the dried leaves of *Cinnamomum nitidum*, and partly of *C. Tamala*, species of cinnamon, small Indian trees or shrubs.

FOLIGNO, *fō-lēn'yō*: town of central Italy, province of Perugia, in the fruitful valley of the Topino, 18 m. n. of Spoleto. It was formerly surrounded by walls, which have been converted into promenades. It has regular streets, and some important buildings, including the beautiful cathedral, the theatre, the Palazzo Comunale, the hospital, and several churches. Raphael's Madonna di Foligno, now in the Vatican, formerly hung in a convent here. Soap, comfits, and silks are manufactured. F., the ancient Umbrian *Fulginium*, was called in the middle ages Fulignum. In 1832, it suffered severely from an earthquake. Pop. 8,500; of the town district (1881) 22,888.

FOLIO, n. *fō'li-ō* [It. *foglio*, two opposite pages; old It. and Sp. *folio*, the leaf of a book—from L. *fōliūm*, a leaf]: in *book-keeping*, the right and left hand pages; a page; any book of the largest size formed by once doubling a sheet of paper; in *law writing*, a page containing a certain number of words, in England ranging from 72 to 90, in New York 100. IN FOLIO, when a sheet makes but two leaves without further folding. FOLIO-POST, a flat writing-paper, usually 17 × 24 inches.

FOLK, n. *fōk* [AS. *folc*; Icel. *fylki*, or *fulki*, a troop, a district: L. *vulgus*, the people: Pol. *pulk*, a regiment of soldiers: comp. Gael. *fo-luchd*, the lower or under people]: people in general, whether young or old; mankind; nations. FOLK-LAND: see FOLCLAND. FOLK-LORE, or FOLKS-LORE, *fōk'lōr* [*folk*, and *lore*: Ger. *volkslehre*]: see below. FOLK-MOTE, -*mōt* [AS. *mot*, an assembly]: an assembly of the people; a Saxon term for district meetings generally, though Kemble maintains that it was originally the great meeting of the nation, afterward converted into the Witenagemôte (q.v.). See Kemble's *Saxons in England*, II. 194. FOLKRIGHT, mentioned in the laws of King Edward the elder, denotes rights which the common law assigns to the people of England.

FOLKES, *fōlks*, MARTIN, LL.D.: 1690–1754; b. Westminster: English scholar and antiquary. He was educated at Clare Hall, Cambridge. In 1713, he was chosen a fellow of the Royal Soc. of London, and 1741 he succeeded Sir Hans Sloane as pres. of that learned body. He was also a member of the Antiquarian Soc., and of the Royal Acad. of Sciences at Paris. F. was the author of

A Table of English Gold Coins from the 18th Edward III., when Gold was first coined in England (Lond. 1736, 4to), with *A Table of English Silver Coins, from the Norman Conquest; to which is added an Appendix, answering the Coins minted in Scotland since the Union of the two Crowns* (Lond. 1745, folio), published under the care of the Antiquarian Soc., superintended by Dr. Giffard (1763, 2 vols.). He contributed papers to the *Philosophical Transactions*.

FOLKESTONE, *fōk'ston*: municipal borough, seaport, and bathing-place on the coast of Kent, England, five m. from Dover, 83 m. e.s.e. of London. It stands on uneven ground at the foot of a range of hills. The oldest part lies in a narrow valley, crossed by a magnificent railway viaduct. It has rapidly extended and improved since the opening of the south-eastern railway and the establishment of steam-packets to Bologne. The harbor is much used by boats engaged in the herring and mackerel fisheries. The view from the pier extends from Shakspeare Cliff, at Dover, to Fairlight Head, at Hastings; the Boulogne heights also are seen. In the vicinity are the remains of Roman intrenchments. Here Harvey, discoverer of the circulation of the blood, was born. Pop. (1891) 30,282.

FOLK-LORE, *fōk'lōr*: department of antiquities or archeology, relating to ancient observances and customs, also legends, traditions, and superstitions among the common people. In England, the literature of this subject commenced with the *Miscellanies* of John Aubrey, 1696, in which are chapters on Omens, Dreams, Corpse Candles, Second Sight, etc., rather, however, the superstitions, than the ordinary observances and customs, of the people. The first book on the general subject of F.-L. was an octavo vol. by the Rev. Henry Bourne, published Newcastle 1725, under the title of *Antiquitates Vulgares, or the Antiquities of the Common People*. It consists mainly of an account of popular customs in connection with the feasts of the church. Fifty years later, John Brand, M.A., native of Newcastle, published at that city the first ed. of his *Observations on the Popular Antiquities of Great Britain*, subsequently enlarged by himself, partly from the stores of F.-L. in the *Statistical Account of Scotland* (edited by Sinclair, 1791-95), but reissued, thoroughly revised, in 1813 (2 vols.), by Sir Henry Ellis of the British Museum. This work, in which Bourne's was incorporated, has been largely supplemented by Hone's *Every-day Book* and *Year Book*, Chambers's *Book of Days* (2 vols.), and *Notes and Queries*. Thus, there is now accessible much information on popular festivals of every kind; on all observances in domestic life, as marriages, sepulture, etc.; on fireside amusements; on superstitions and vulgar errors. What may be called a sub-section of F.-L. has been amply illustrated in *Nursery Rhymes*, edited by J. O. Halliwell, and *Popular Rhymes of Scotland*, edited by Robert Chambers. While F.-L. has thus been engaging the attention of literary men, and put beyond risk of oblivion by taking its place in solid books,

it is everywhere declining among the people. To this effect, the diffusion of scientific ideas, the disfavor of the clergy for everything connected with the supernatural except religion itself, and the great industrial changes and improvements of the last 50 years, with an increased shifting of the people from one district to another, all have conduced. In Germany, the learned brothers Jacob and Wilhelm Grimm have turned the ancient simple usages and traditions of the peasant's fireside to excellent account in illustrating remote periods of the national history.

The columns of *Notes and Queries*, and the publications of the F.-L. Soc., established 1874, with translations of F.-L. tales from other countries, have widened the horizon for English students, and given this department a historical importance. Among important recent books on this subject are Busk's *Roman F.-L.*; Calloway's *Nursery Tales of the Zulus*; Campbell's *Popular Tales of the West Highlands*; Dasent's *Popular Tales from the Norse*; Hahn's *Griechische u. Albanesische Märchen*; Ralston's *Russian F.-L.*; Sébillot's *Contes Populaires de la Haute-Bretagne* (3 series); the two series, *Les Littératures Populaires de toutes les Nations* (Paris, Maisonneuve, 18 vols., to 1883), and *Collection de Contes et de Chansons Populaires* (Paris, Leroux, 7 vols., to 1883); *Biblioteca de las Tradiciones Populares Españolas* (Madrid, 6 vols., to 1884); and Crane's *Italian Popular Tales* (1885). The *F.-L. Journal* in England, *Mélysine* in France (commenced 1878, second vol. that for 1885), *Archivio per lo Studio delle Tradizioni Popolari* (commenced 1882) in Italy, and *Boletín Folklorico Español* in Spain, are journals specially for this study. For the philosophy underlying F.-L., see Tylor's *Primitive Culture*, and Lang's *Custom and Myth* (1884).

FOLLEN, *föl'en*, AUGUST (or ADOLF) LUDWIG: 1794, Jan. 21—1855, Dec. 26; b. Giessen, Germany: poet. He studied theology and philology in Giessen, was in the campaign against France 1814, studied law at Heidelberg, became editor of the *Allgemeine Zeitung* at Elberfeld 1817, was imprisoned for political reasons 1819–22, and subsequently settled in Berne, Switzerland. He published translations of Homer (1814) and Latin hymnologists (1819), *Free Voices of Fresh Youth* (1819), and *Picture-gallery of German Poetry* (1827).

FOL'LEN, CHARLES THEODORE CHRISTIAN, PH.D., LL.D.: 1796, Sep. 4—1840, Jan. 13; b. Romrod, Hesse-Darmstadt: Unit. minister and author. He was educated at Giessen, served with his brother August Ludwig F. in the campaign against Napoleon 1814, fled to Switzerland on account of persecutions for his political opinions 1820, and became prof. of law in the Univ. of Bâle 1821. His liberal views of theology, as well as of politics, led the Holy Alliance to demand his deliverance for trial 1824, when he fled first to Paris, then to the United States. Through the influence of Lafayette and other friends, he was appointed tutor of German in Harvard Univ. 1825. He studied divinity with Dr. Channing, and was ordained a

FOLLICLE—FOMALHAUT.

Unit. minister and appointed prof. of ecclesiastical history and ethics in the Cambridge Divinity School 1828, and 1830 became also prof. of German language and literature. F. was pastor of the First Unit. Church, New York, 1836-7, from which he retired as a result of his opposition to slavery; and 1839 was called to East Lexington, Mass. While *en route* to his new church, he perished in the burning of the steamboat *Lexington* on Long Island Sound. He published a *German Reader* (1831), *Practical Grammar of the German Language* (1831), and numerous essays, lectures, and sermons. He received his degrees from Giessen Univ. 1818.

FOLLICLE, n. *fōl'li-kl* [F. *follicule*—from L. *follicūlus*, a small bag or ball inflated with air—from *follis*, a bag or bellows]: an air-bag; a little bag; a cavity; a pod opening along one side, to which the seeds are attached, as in the peony. **FOLLICULOUS**, a. *fōl-lik'ū-lūs*, or **FOLLIC'ULAR**, a. *-ū-ler*, having or producing follicles. **FOLLICULAR GLANDS**, small rounded secreting bodies, in various parts of the alimentary mucous membrane. They are called also Conglobate and Lymphoid Glands, and may be solitary or agminated.

FOLLOW, v. *fōl'lo* [AS. *folgian*; Ger. *folgen*; Icel. *fylgia*, to follow]: to go after or behind; to succeed in order; to come after; to attend; to pursue; to result from or ensue; to adopt; to practice, as a trade. **FOL'LOWING**, imp.: **ADJ.** being next after; succeeding; subsequent: **N.** body of followers. **FOL'LOWED**, pp. *-lōd*. **FOL'LOWER**, n. a disciple; an imitator; a companion; a male sweetheart, as of a servant. **CAMP FOLLOWERS**, civilians who accompany troops as servants, sutlers, etc.—**SYN.** of 'follow': to chase; accompany; obey; watch; understand; walk in; attend upon; succeed; imitate; copy; embrace; maintain; ensue;—of 'follower': copier; adherent; partisan; dependent; attendant.

FOLLY, n. *fōl'li* [from *fool*: F. *folie*, folly—from *fol*, mad, crazy—from mid. L. *follus*, one who grimaces: L. *follis*, a grimace by puffing out the cheeks]: a weak or absurd act; a weakness of mind; sin.

FOLLY ISLAND, *fōl'li īl'and*: sea-island of Charleston co., S. C., extending from Lighthouse Inlet on the n.e. to Stone river on the s.w., with the Atlantic Ocean on the s.e., and F. I. river on the n.w. A large part of its surface is heavily covered with timber. F. I. was a point of considerable importance during attacks on Charleston in the war of secession.

FOLSOM, *fōl'som*, **NATHANIEL**: 1726-1790, May 26; b. Exeter, N. H.: legislator. He was a capt. in the French war 1755, col. of militia prior to the revolutionary war, brig.gen. at the siege of Boston, member of the continental congress 1774-5, 1777-80, councilor 1778, and pres. of the N. H. constitutional convention 1783.

FOMALHAUT, n. *fō-māl-hawt'* [Arab. *Fom-al-hūt*, mouth of the large fish—from *fom*, *fam*, mouth, *hūt*, a large fish]: a fixed star of the first magnitude called also α *Piscis Australis*.

FOMENT—FOND DU LAC.

FOMENT, v. *fō-měnt'* [F. *fomenter*—from L. *fomentārē*, to foment: L. *fomentum*, an application to assuage pain—from *forēō*, I warm, I cherish]: to bathe with warm liquids; to encourage or promote, as discord or discontent. **FOMENT'-ING**, imp. **FOMENT'ED**, pp. **FOMENTATION**, n. *fō'měn-tā-shūn* [F.]: the act of fomenting; application of warmth and moisture to a part of the body, usually by means of cloths wrung out of hot water, sometimes medicated with vegetable infusions of substances calculated to relieve pain or stimulate the surface, such as opium, belladonna, camomile, turpentine, etc. Fomentations are used in almost all painful local disorders. **FOMENT'ER**, n. one who foments.

FOMES, n. *fō'mēz*, **FOMITES**, n. plu. *fō'mī-tēz* [L. *fōmēs*, touchwood, fuel; *fōmītēs*, decayed wood, fuel]: porous substances capable of absorbing and retaining contagious matter, probably germs; woolen cloth and wood are said to be excellent 'fomites.'

FONBLANQUE, *fōn-blängk'*, **ALBANY**: 1797-1872, Oct. 14: journalist. He was intended for the bar, and became a pupil of Chitty, the eminent special pleader. Castle-reagh's Six Acts made him a political writer. As editor of the *Examiner*, the leading liberal weekly journal, F. exhibited singular keenness of wit and intellect, and exercised considerable influence on public opinion 1826-36. Leigh Hunt, his predecessor in the editorship of the *Examiner*, says of him in his Autobiography, 'He was the genuine successor, not of me, but of the Swifts and Addison themselves; profuse of wit even beyond them, and superior in political knowledge.' The characteristics of his political writings may be gathered from his work entitled *England under Seven Administrations* (1837), a reprint of the more historical leading articles in the *Examiner* from the period of the Canning and Goderich ministries, to the return of the Melbourne ministry. F.'s services to the whigs were rewarded by his appointment as sec. to the statistical dept. of the board of trade 1852. He afterward became head of the same dept., and comptroller of corn returns. See *Life and Labors of A. F.*, by his nephew (1874).

FOND, a. *fōnd* [OE. *fonne*, to be foolish: Icel. *fani*; Sw. *fune*, a fool: Gael. *faoín*, vain, foolish; *fonn*, delight, pleasure]: foolishly attached to one; tender and loving; much pleased with; partial to; used in the sense of slightly foolish or silly: V. in OE., to be in love with. **FOND'ING**, imp. **FOND'ED**, pp. **FOND'LY**, ad. *-lī*, in a fond manner; foolishly. **FOND'NESS**, n. tender interest; attachment; strong inclination; strong appetite. **FONDLE**, v. *fōnd'l*, to caress; to treat with tenderness. **FONDLING**, imp. *fōnd'ling*: N. a person or thing fondled or caressed. **FONDLED**, pp. *fōnd'ld*. —**SYN.** of 'fondness': love; affection; kindness; foolishness; weakness; propensity; relish.

FOND DU LAC, *fōn'dū lāk*, Fr. *fōng dū lāk* [Fr.]: the furthest inland extremity of any great body of fresh water. It has been adopted as a name of counties and towns adja-

FOND DU LAC—FONT.

cent to such waters in that portion of the United States which originally belonged to French Canada.

FOND DU LAC: city, cap. F. du L. co., Wis.; at mouth of F. du L. river, on Lake Winnebago; on the F. du L. Amboy and Peoria, and at the crossing of the Chicago and Northwestern and the Sheboygan and F. du L. railroads; 43 m. w. of Sheboygan, 63 m. n.n.w. of Milwaukee, 148 m. n. by w. of Chicago. It is beautifully situated; is accessible by steamboat from Green Bay and all parts on Lake Winnebago; is supplied with water by artesian wells, has a steam fire department, fire-alarm telegraph, gas, and electricity; contains numerous elegant residences, court-house, opera house, high school, high academy for girls, two convents, two public libraries, and several handsome parks; and has 4 Rom. Cath., 4 Meth. Episc., 2 Bap., 2 Prot. Episc., 2 Lutheran, 1 Congl., 1 Evangel., 1 Presb., and 1 Univ. churches. There are 3 nat. banks (cap. \$350,000), 2 private banks. Pop. (1860) 5,450; (1870) 12,764; (1880) 13,094; (1900) 15,110.

FONDI, *fōn'dē* (anciently *Fundī*): small town of Italy, in the n.w. of the province of Caserta, six m. from the coast, on the Appian Way which now forms its principal street, 56 m. n.w. of Naples. It is an ill-built, dirty, and miserable town, in the neighborhood of a pestiferous lake (the ancient *Lacus Fundanus*); the surrounding plain, however the ancient *Cæcubus Ager*, which produced the famous Cæcuban wine of classic times), is very fruitful. F. is surrounded in part by walls of cyclopean structure, and its inhabitants were long notorious for brigandage and lawlessness. Pop. 6,740.

FONDU, n. *fawng-dô* [F. *fondū*, pp. of *fondre*, to melt, to soften, to blend: L. *fundo*, I pour out]: style of calico-printing or paper-hanging in which the colors are in bands and blend into each other; in *cooking*, a light and pleasant preparation of cheese.

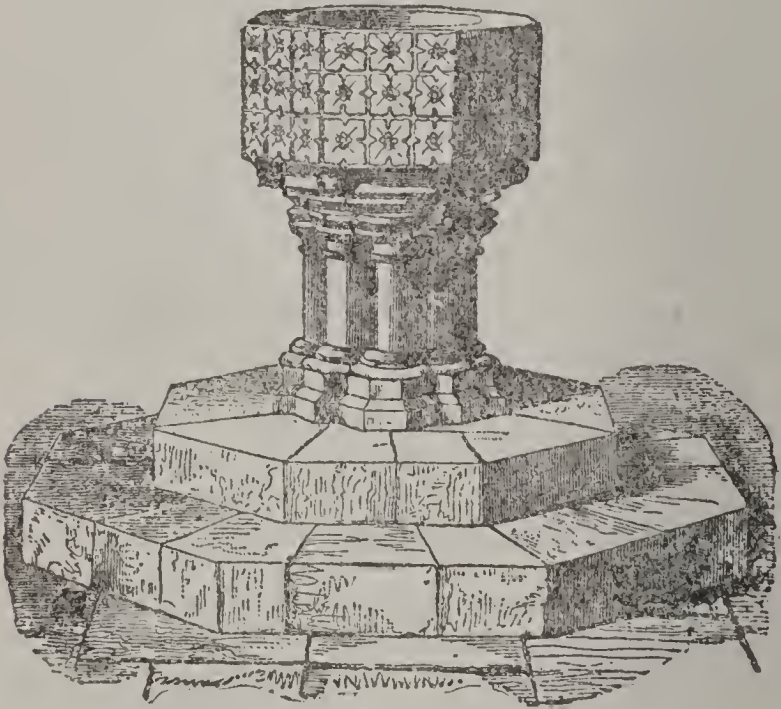
FONSECA, *fōn-sā'ká*: bay on the Pacific coast of Central America, between the two states San Salvador and Nicaragua; notable principally as the proposed terminus of an inter-oceanic railway from the Puerto Caballos in Honduras. The intervening country has been surveyed, and reported as favorable.

FONT, n. *fōnt*, or **FOUNT**, n. *fownt* [F. *fonte*, a melting, founding—from *fondre*, to cast: L. *fundērē*, to pour, to melt]: a complete assortment of types of one sort.

FONT, n. *fōnt* [L. *fontēm*, a font: It. *fonte*: F. *fonts*—from L. *fontēs*, fonts]: a baptismal basin. **FONTAL**, a. *fōn'āl*, pertaining to a fount or source.—**Font** (*Fons Baptismalis*) is the vessel used in churches as the repository of the baptismal water. In the early period, while immersion, or affusion (pouring water on the head), continued the ordinary rite of the administration of baptism, the baptistery (see **BAPTISTRY**), or other place set apart for the ceremony, was furnished with a basin sufficiently capacious for such administration. When sprinkling became the prevailing mode, the size of the basin was naturally diminished, and eventually it assumed the dimensions and the form now familiar. The

FONT.

F., in its normal form, consists of a basin or cup, more or less capacious, hollowed out of a solid block, and supported upon a stem or pedestal. It is ordinarily of stone, rarely of wood; some ancient examples of leaden fonts also occur, and a few of copper or of bronze. In general the F. in external form and character followed the prevailing style of ecclesiastical architecture and ornamentation. From its connection with one of the most solemn rites of religion, it became early a favorite subject for the decorative skill of the artist, and there are still in different English churches fonts which exhibit characteristics of all the successive fashions through which church architecture has passed since the introduction of the F. in its present form. There is some doubt as to whether any existing specimen in England really belongs to the Saxon period, but examples are found of all later styles, from the Early Norman down to the latest revival of Gothic in our own day; the Early English, the



Font.

Decorated, of which a beautiful example occurs in the Church of All Saints, Norwich; and the Perpendicular, seen in perfection at East Dereham in the same county of Norfolk. The annexed engraving exhibits a highly characteristic specimen of the fonts of the beginning of the 14th c., in the church of Swaton, Lincolnshire, erected about 1310.

The external figure of the basin seems to have been originally circular or elliptical: but most of the later fonts are hexagonal, or eight-sided. The basin was usually supported on a single pillar or stem. Many cases, however, occur in which it rests on three, four, or five pillars, or, as in the engraving, on a group of pillars or pilasters united into a solid stem. The exterior, as well of the basin as of the pedestal, was often highly decorated, ordinarily with sculpture, occasionally in gold and colors; the designs on

FONTAINE—FONTAINEBLEAU.

the basins commonly representing subjects connected with baptism, or its types and symbols. Frequently around the pedestal figures of the apostles are seen, sometimes only eleven in number, Judas being omitted.

In the Rom. Cath. Church, the service of Easter Saturday contains a solemn form for the blessing of the F. After a long series of prayers, and amid a very imposing ceremonial, the 'chrism, or consecrated oil blessed by the bishop, and also the so-called 'oil of catechumens,' are mingled with the baptismal water, which is reserved for subsequent use. For the preservation of the water thus reserved, the font, especially when it is of porous stone, is sometimes lined with lead; and from an early date, it is furnished with a lid, which is secured by a lock, and is highly ornamented. The ordinary place of the font is at the w. end of the nave, near the entrance of the church, but in many cases it stands in a separate chapel or baptistery, or at least in a compartment screened off for the purpose. Even when it stands in an open nave, it is properly inclosed by a rail.

The baptismal F. is not to be confounded with the 'holy-water fount,' which usually stands near the entrance of the entrance of Rom. Cath. churches, and from which persons entering sprinkle their forehead, in recognition of the inward purity requisite in entering the house of God; nor with the *piscina* or *sacrarium*, found in the chancel or the sacristy of ancient churches, and intended to receive and carry away the water used in cleansing the sacred vessels, the altar-linens, and the other furniture used in the administration of the eucharist. See Paley's *Illustrations of Baptismal Fonts*; Simpson's *Series of Baptismal Fonts*; Wetser's *Kirchen Lexicon*; Binterim's *Denkwürdigkeiten*.

FONTAINE, JEAN DE LA: see LA FONTAINE, JEAN DE.

FONTAINEBLEAU, *fōng-tān-blō*: town in France, dept. of Seine-et-Marne, beautifully situated in an extensive forest, near the left bank of the Seine, 35 m. s.e. of Paris, with which it is connected by steamers on the Seine, and by railway. There are several fine public buildings, among others, two hospitals—one erected by Anne of Austria, the other by Madame de Montespan. It furnishes much wine and fruit for the capital, and has manufactures of porcelain. Its grapes are famed as *Chasselas de Fontainebleau*. Pop. (1896) 14,078—F. is famous for its château, or pleasure-palace of the kings of France, and the forest that surrounds it. The forest covers 64 sq. m., much fine scenery. The château, founded by Robert the Pious toward the end of the 10th c., was rebuilt in the 12th c. by Louis VII., of whom, and of Philippe Auguste, it was a favorite residence, and was enlarged by Louis IX. and his successors. After being allowed to fall into decay, it was repaired and embellished by Francis I., who here received the emperor Charles V. with lavish splendor, 1539. Almost every succeeding king added something in the way of enlargement or embellishment, so that it bears the character and

FONTANA.

style of almost every century. In the 17th c., it was the residence of Christina of Sweden after her abdication, and in the *Galerie des Cerfs* she caused her sec. Monaldeschi to be put to death for treason. Under Louis XIV. it was occupied by the Madame de Montespan, and under Louis XV. by Du Barry; and here Pope Pius VII. was detained a prisoner nearly two years by Napoleon. Many state transactions and treaties are dated from F.; among others, the act of abdication of Napoleon, 1814. Louis Philippe had all the paintings renovated and the apartments restored in the taste of the 16th century.

FONTANA, *fon-tà'ná*, DOMENICO: 1543-1607; b. Mili, in the vicinity of Lake Como: engineer and architect. At the age of 20 he joined his brother, also an architect in Rome, and soon achieved a reputation sufficiently brilliant to attract the notice of the magnificent Cardinal Montalto, to whom he was appointed private architect. The pomp of this cardinal seems to have given umbrage to Pope Gregory XII., who in consequence, discontinued the cardinal's private pensions, and thus disabled him from completing the splendid works that he had intrusted to F.—viz., the Sistina Chapel in Santa Maria Maggiore, and an adjoining palace. In this emergency, the spirited architect, out of his own funds, carried on the noble designs of his patron, on the same scale of magnificence in which they were commenced, and for his disinterested devotion received later ample reward, when the cardinal under the name of Sixtus V., was called to the papal chair. F., as papal architect, was employed in a variety of important works, among which stands conspicuously the wonderful removal and re-erection of the colossal Egyptian obelisk, now in the piazza of St. Peter's. He afterward erected several other obelisks, and was intrusted by Sixtus with the construction of the Lateran Palace, and of the famous Vatican Library. The restoration of the columns of Trajan and Antoninus, and the construction of the aqueduct known as the *Aqua Felice*, are among the many works of utility executed by Fontana. On the death of friend and patron, Pope Sixtus, F., through the intrigues of invidious enemies, was stripped of his post as papal architect 1592, but was immediately proffered a similar appointment in the name of the king of Naples. During his sojourn in Naples, he executed many imposing designs. His conception of a grander harbor was carried into effect by others after his death at Naples.

FONTANA, FELICE: 1730-1803, Mar. 9; b. Pomarolo, in the Italian Tyrol: physiologist. He studied in the universities of Verona, Parma, Padua, and Bologna, and was presented to the chair of philosophy in the Univ. of Pisa. Afterward, as court physiologist, he organized a museum of natural history and physiology, with specimens and wax models, which to this day is one of the scientific marvels of Florence. A similar collection was executed by F. for the museum of Vienna, by order of Emperor Joseph II. F.'s chief writings consist of scientific considerations on the various phenomena of physical irritability, *Recherche*

FONTANA—FONTENAY-LE-CÔMTE.

Filosofiche sopra la Fisica Animale (Florence 1781), and *Dei Moti dell' Iride* (Lucca 1765).

FONTANA, *fon-tâ'nâ*, LAVINA: portrait painter: 1552–1614; b. Bologna, Italy; daughter of Prospero F. (1512–97), a noted painter and instructor of the Caracci. She married an artist named Zappi, and was appointed painter to Pope Gregory XIII. She established a studio in Rome, frequented by the most eminent men and women of the day, and, unlike her father, painted with such extreme care and feeling that many of her works were subsequently attributed to Guido. Beside her portraits she painted historical, religious, and ideal subjects. Many of her works are preserved in the churches of Bologna. Her *Madonna*, *The Miracle of the Louves*, and a *Holy Family*, have been highly praised.

FONTANELS, n. *fôn'tâ-něls* [F. *fontanelle*, meeting of the seams of the skull—from *fontaine*; L. *fontēm*, a fountain]: three or four membranous spaces left in the head of an infant where the frontal and occipital bones join the parietal, the chief one being at the crossing of the main sutures. About two years after birth it is usually closed by the extension of the bones adjacent. FONTIC'ULUS, n. *-tîk'-û-lûs*, or FONTANEL, a small ulcer, artificially produced, for the discharge of humors from the body; it is easily induced by a hard substance kept for a time under the skin.

FONTANES, *fông-tân'*, LOUIS, Marquis DE: 1757, Mar. 7—1821, Mar. 17; b. at Niort, of an old Prot. family of Languedoc. After the completion of his studies, he went to Paris, where he acquired a reputation by his poems, *Le Cri de mon Cœur* (Paris 1778), and *Le Verger* (Paris 1778), as also by his metrical translation of Pope's *Essay on Man*, and his imitation of Gray's *Elegy written in a Country Churchyard*. During the Revolution, F. conducted various journals in the popular interest. In 1802, he was made a member, and in 1804 pres. of the legislative body. His admiration of Napoleon was great; and his splendid oratorical talents were often employed in eulogizing the emperor's acts. In 1810, he entered the senate. After the fall of Napoleon, he passed in the service of the restored Bourbons, and was raised to the peerage by Louis XVIII. His writings, prose and poetic, collected and edited by Sainte-Beuve (2 vols. Paris. 1837), are regarded as models of elegance and correctness.

FONTANGE, n. *fông-tângzh'* [named after Mlle. (afterward Duchesse) de *Fontange*, mistress of Louis XIV., introducer of the fashion]: head-dress worn by ladies at the beginning of the 18th c., a structure of wire which bore up the hair and the fore part of the lace cap to a great height.

FONTARABIA: see FUENTERRABIA.

FONTENAY-LE-COMTE, *fông-tê-nâ'lê kôngt*, or FONTENAY-VEKDÉE, *-vông-dâ*: town of France, dept. of Vendée, in a pleasant valley on the right bank of the Vendée, 27 m. n.e. of La Rochelle. The streets of the older portion of the town are narrow and tortuous. Its chief buildings are the

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beautiful Gothic church of Notre Dame, with spire 311 ft. high; the college, the theatre, and the fountain from which the town is said to have derived its name. F. has linen manufactures, tanneries, and a trade in timber, and is an entrepôt for the victuals and commodities of the south. Pop. (1881) 8,173. (1886) 9,282.

FONTENELLE, *fōn-téh-něł'*, F. *fōngt-něł'*, BERNARD LE BOVIER DE: 1657, Feb. 11—1757, Jan. 9; b. Rouen: French author. His father was an advocate, and his mother a sister of the great Corneille. He studied in the college of the Jesuits at Rouen; then for three years he professed to study law, but in reality busied himself with history, poetry, and philosophy. After passing as an advocate he commenced to practice, lost the first cause which he conducted, and renounced the bar. In 1674 he went to Paris, entered upon a literary career, and soon attained celebrity. He was a member of several learned societies, and from 1699 to 1741 was sec. of the Académie des Sciences, but declined the post of president. F. died at Paris, having nearly finished his 100th year, wittily remarking to his friends, as he expired: *Je ne souffre pas, mes amis; mais je sens une certaine difficulté d'être* ('I don't suffer, my friends, but I feel a sort of difficulty in living any longer'). The greater part of his numerous writings in a great variety of departments, admired in their time, have fallen into oblivion, though his *Histoire du Théâtre Français jusqu'à Pierre Corneille* is still consulted. F. was celebrated for his *bonmots*; and for the manner in which he edited the *Mémoires de l'Académie des Sciences*, and executed his *Eloges*. At the age of 92 he still wrote madrigals. His *Œuvres Complètes* have been republished several times. The most complete edition is that published at Paris (5 vols., 1825).

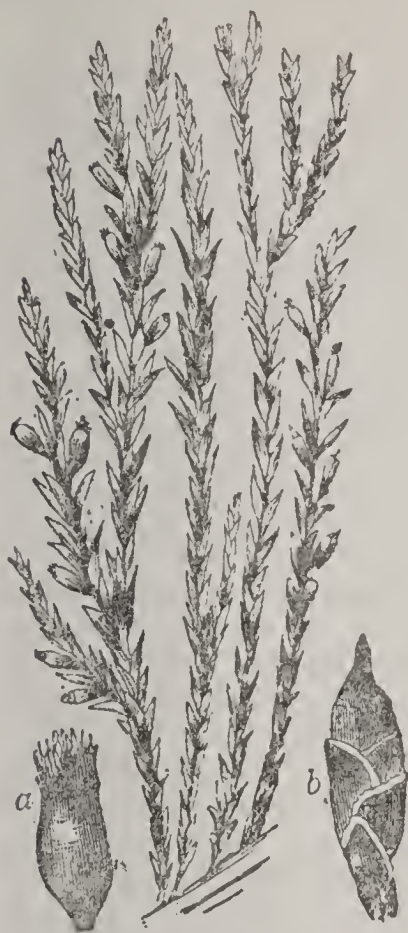
FONTENOY, *fōng-téh-nwá'*: village of Belgium, province of Hainaut, 5 m. s.w. of Tournay, notable as the scene of the battle of F., 1745, May 11, one of the most famous in the war of the Austrian Succession. The opposing forces being the French, 60,000 strong, under Marshal Saxe, and the allies (English, Dutch, and Austrians), in nearly equal force, under the Duke of Cumberland. After a hard fight, the allies were forced to retreat. The loss on both sides was stated at about 7,000 men. Pop. of F. abt. 800.

FONTEVRAULT, *fōng-téh-vrō'* (*Fons Ebraldi*): small town of France, dept. of Maine-et-Loire, 8 m. s.e. of Saumur. It owes its origin to a wealthy and celebrated abbey, now converted into a prison for 11 departments. This abbey was founded 1099 by Robert d'Arhrissel, a Breton monk, as the residence of a monastic society of penitents of both sexes. This society took the name of the *Order of Fontevrault*. It followed the austere rule of Benedict, but had this peculiarity, that the monks were ruled by an abbess, and not by an abbot. The order of F. soon spread through France, and into Spain, and in France especially acquired great riches. The abbesses of F. belonged, for the most part, to illustrious families, and were subject only to the popes. At a later period, the strictness of the mo-

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nastic discipline was relaxed in favor of the nuns, whence, however, in the 14th c., sprang great disorders. Gradually, the order of F. fell into disrespect, but even at the out-

break of the French Revolution it possessed 57 priories in France, which were then abolished with the other monasteries. The town is of interest as containing the cemetery of several of the Plantagenet kings of England and of the counts of Anjou; though only the tombs of Henry II., of his queen Eleanor of Guienne, of Cœur-de-Lion, and of Isabelle, queen of John, have been preserved. The old monastic buildings and courtyards, surrounded by walls, and covering 40 to 50 acres, now form one of the larger prisons of France, in which about 2,000 men and boys are confined, and kept at industrial occupations. See the history of this famous royal abbey, *Fontevrault et ses Monuments*, by Edouard (2 vols., 1875). Pop. of F. abt. 2,500.



Greater Water-Moss (*Fontinalis antipyretica*):

a, spore-case or capsule, divested of calyptra and lid, showing the peristome; b, spore-case, with its involucre of leaf-like scales.

FONTINALIS, fŏn-tĭn-ă'lis: genus of mosses, allied to *Hypnum*, but having the fruit in the bosom of the leaves, almost without stalk. One species, the Greater Water-moss *F. antipyretica*), growing upon rocks and roots of trees in brooks and ponds, is remarkable for the difficulty with which it burns, even when completely dried; on which account it is used in parts of the n. of Europe for lining chimneys, to protect the adjacent wood-work from fire. Its shoots are 12 inches or more in length, and branched; they float in the water. The fruit is on the sides of the stems.

FOO-CHOO-FOO, or Foo-CHOW: see FU-CHOW-FOO.

FOOD—FOOD AND DRINK.

FOOD, *n.* *fód* [*AS.* *foda*, nourishment: *Dut.* *voeden*, to feed, to bring up: *Goth.* *fodjan*, to nourish: *Gael.* *fiadh*, meat, food]: whatever is eaten by animals for nourishment; victuals. **FOOD'LESS**, *a.* not affording food. — **SYN.** of 'food': diet; fare; aliment; nutriment; sustenance; meat; victuals; feed; provisions.

FOOD AND DRINK: substances eaten or imbibed by man and other animals for nourishment or beverage. Although about 60 elementary substances are known to chemists, only a small number of these have part in the formation of man and other animals; and it is only this small number of constituents which are essential elements of food. These elements are carbon, hydrogen, nitrogen, oxygen, phosphorus, sulphur, chlorine, sodium, potassium, calcium, magnesium, iron, and fluorine.

Carbon, hydrogen, nitrogen, and oxygen are supplied to the system by the albuminous group of alimentary principles (see **DIET**)—viz.; albumen, fibrine, and caseine, which occur both in the animal and vegetable kingdoms, and the gluten contained in vegetables. Animal flesh, eggs, milk, grain, and many other vegetable products, contain one or more of these principles. The gelatinous group also introduces the same elements into the system, when such substances as preparations of isinglass, calves' feet, etc., are taken as food. Carbon, hydrogen, and oxygen are abundantly introduced into the system in the form of sugar, starch (which occurs in large quantity in the cereal grains, leguminous seeds, roots, tubers, etc., used as food), and organic acids (which, as citric, malic, tartaric acid, etc., occur in numerous vegetables employed as food). Carbon with a little hydrogen and oxygen occurs abundantly in the oleaginous group of alimentary principles, as, for instance, in all the fat, suet, butter, and oil that we eat; in the oily seeds, as nuts, walnuts, cocoa-nuts, etc; and in fatty foods, as liver, brain, etc. Phosphorus is supplied by the flesh, blood, and bones used as food (the flesh of fishes is especially rich in phosphoric matter), and in the form of various phosphates, it is a constituent of many of the vegetables used as food. The system derives its sulphur from the fibrine of flesh, the albumen of eggs, and the caseine of milk, from the vegetable fibrine of grain, etc., from the vegetable albumen of turnips, cauliflowers, asparagus, etc., and from the vegetable caseine of peas and beans. Most of the culinary vegetables contain it, especially the *Cruciferae*. Chlorine and sodium, in the form of chloride of sodium, are more or less abundantly contained in all varieties of animal food, and are taken separately as common salt. Potassium is a constituent of both animal and vegetable food; it occurs in considerable quantity in milk, and in the juice that permeates animal flesh; and most inland plants contain it. We derive the calcium of our system from flesh, bones, eggs, milk, etc. (all of which contain salts of lime); most vegetables also contain lime-salts; and another source of our calcium is common water, which usually contains both bicarbonate and sulphate of lime. Magnesium in small quantity is generally found in those

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foods that contain calcium. Iron is a constituent of the blood found in meat; and it occurs in smaller quantity in milk, in the yolk of egg, and in traces in most vegetable foods. Fluorine occurs in minute quantity in the bones and teeth. This small quantity is accounted for by the traces of fluorine found by Dr. George Wilson in milk, blood, etc.

These simple bodies are not, however, capable of being assimilated and converted into tissue; they must be previously combined, and this combination is conducted primarily by the vegetable kingdom. The number of combined elements varies: thus water contains only two; sugar, starch, fat, and many organic acids, contain three; caseine contains five; and fibrine and albumen contain six.

For the different animals and plants used as food by different nations, see Moleschott's *Physiologie der Nahrungsmittel*, 1850, and especially Reich's *Nahrungs- und Genussmittelkunde* (1860-1), the most learned and elaborate work on the subject in any language.

DRINKS are merely liquid foods. They all pertain to the aqueous group (see DIET). They are arranged by Pereira in his *Treatise on Food and Diet* in the six following orders:

1. Mucilaginous, farinaceous, or saccharine drinks—as toast-water, barley-water, gruel, etc.: very slightly nutritive, differing little from common water.

2. Aromatic or astringent drinks—as tea, coffee, chocolate, and cocoa: for the action of the first two see DIET: the last two drinks contain considerable oil and starch.

3. Acidulous drinks—as lemonade, ginger-beer, raspberry-vinegar water, etc.: allaying thirst both by the acid which they contain and by the water, and having cooling antiscorbutic effects.

4. Drinks containing gelatine and osmazome—the broths and soups: containing, if properly prepared, all the soluble constituents of their ingredients.

5. Emulsive or milky drinks—as animal milk, the milk of the cocoa-nut, and almond milk prepared from sweet almonds: animal milk contains all the essential ingredients of food; the others are slightly nutritive.

6. Alcoholic and other intoxicating drinks—including malt liquor or beer in its various forms of ale, stout, and porter; wines; spirits in their various forms of brandy, rum, gin, whisky, etc.

‘Considered dietetically,’ says Pereira, ‘beer possesses a threefold property: it quenches thirst; it stimulates, cheers, and, if taken in sufficient quantity, intoxicates; and lastly, it nourishes or strengthens. The power of appeasing thirst depends on the aqueous ingredient which it contains, assisted somewhat by its acidulous constituents (carbonic and acetic acid): its stimulating, cheering, or intoxicating power is derived either wholly or principally from the alcohol which it contains (2 to 3 per cent.) [in some stronger kinds 5 to 7, and exceptionally 10 per cent.]; lastly, its nutritive or strengthening quality is derived from the sugar, dextrine, and similar substances contained in it; moreover, the bitter principle of hops confers on beer tonic properties. From

these combined qualities, beer proves a refreshing and salubrious drink, if taken in [scrupulous] moderation, and an agreeable and valuable stimulus and support to those who have to undergo much bodily fatigue.' See BEER.

Wine is deemed the most valuable restorative when the powers of the body and mind have been overtaxed; but as the most perfect health is compatible with total abstinence from it, no possible benefit can accrue to a healthy person from commencing its use. The uses of wine as a tonic during convalescence after lingering diseases, and of either wine or spirits in some acute diseases (fevers, etc.), are well known.

For action of spirituous drinks, see DIET: and further, TOTAL ABSTINENCE.

As to the condiments or seasoning agents taken with foods to improve their flavor—excluding salt, which must be considered as a saline alimentary principle, the most common condiments, such as mustard, capsicum (Cayenne pepper), pepper, the various spices, etc., owe their action to the presence of a volatile oil. Sauces are usually fluid mixtures of these condiments with alimentary substances. To one in health, condiments and sauces afford little or no nutrition; and though for a time they may stimulate a debilitated stomach to increased action, their continual use never fails to induce a subsequent increased weakness of that organ. Salt and vinegar are the only exceptions: these used in moderation, assist in digestion; vinegar, by rendering muscular fibre more fluid; and both together, by producing, as Dr. Beaumont believes, a fluid having some analogy to the gastric juice (*Experiments and Observations on the Gastric Juice and the Physiology of Digestion*, p. 40, Edin. 1838).

For the cookery of foods, see BOILING: BROILING: COOKERY: DIET: ETC. The following are general considerations.

All foods possessing an organized structure, as animal flesh and amylaceous substances, require to be cooked, the only exceptions being the oyster and some ripe fruits. The processes of salting, pickling, and smoking harden the animal textures, and, as we shall presently see (at all events in the case of salting), induce chemical changes which render the meat less nutritious.—The ordinary operations of cookery are boiling, roasting, broiling, baking, and frying.

Boiling, in the case of vegetables, effects the solution of gummy and saccharine matters, the rupture and partial solution of starch grains, the coagulation of albuminous liquids, and the more or less complete expulsion of volatile oil. In the boiling of flesh, there takes place more or less separation of the soluble from insoluble constituents according to the duration of the boiling, the amount of water employed, and its temperature at the commencement of the operation. If we wish the boiled meat to contain the largest amount of nourishing matter, and disregard the soup or broth that is simultaneously formed, we introduce it into the boiler when the water is in a state of brisk ebullition. We keep up this boiling for a few minutes, in order to coagulate the albumen near the surface, and thus to convert it

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into a crust or shell, which equally prevents the entrance of water into the interior, and the escape of the juice and soluble constituents of the flesh into the water. If cold water is then added, so as to reduce the temperature to about 160° , and this temperature is kept up for the necessary time—for which, in reference to the weight of the meat, see **BOILING**—all the conditions are, according to Liebig, united which give to the flesh the quality best adapted to its use as food.—If, on the other hand, we wish to obtain good soup from meat, we should place it in cold water, and bring this *very gradually* to the boiling-point. The interchange between the juices of the flesh and the external water, prevented by the former process, here takes place without hindrance. ‘The soluble and sapid constituents of the flesh are dissolved in the water, and the water penetrates into the interior of the mass, which it extracts more or less completely. The flesh loses, while the soup gains, in sapid matters; and by the separation of albumen, which is commonly removed by skimming, as it rises to the surface of the water, when coagulated, the meat loses its tenderness, and becomes tough and hard; and if eaten without the soup, it not only loses much of its nutritive properties, but also of its digestibility.’—Liebig’s *Researches on the Chemistry of Food*, p. 128.

Roasting is applied much more to meat than to vegetables. Both in roasting and broiling meats, the first application of heat should be considerable and rapid, so as to form an outer coating of coagulated albumen (as in boiling), which retains the nutritive matters within the cooked meat. In roasted meat, nothing is removed but some of the superficial fat and the gravy, which is itself an article of food. The effect of roasting on such vegetables as apples and potatoes is to render them more nutritive and digestible than they would be in the raw state, by splitting their starch grains, and rendering them more soluble.

Baking (q.v.) acts in the same manner as roasting; but meat thus cooked is less wholesome, in consequence of its being more impregnated with empyreumatic oil.

Frying is the most objectionable of all kinds of cookery. In this operation, heat is usually applied by the intermedium of boiling fat or oil. Various products of the decomposition of the fat are set free, which are very obnoxious to the stomachs of invalids.

Liebig has shown that salted meat is, so far as nutrition is concerned, in much the same state as meat from which good soup has been made. After flesh has been rubbed and sprinkled with dry salt, a brine is produced, amounting in bulk to one-third of the fluid contained in the raw flesh. This brine is found to contain a large quantity of albumen, soluble phosphates, lactic acid, potash, creatine, and creatinine—substances which are essential to the constitution of the flesh, which therefore loses in nutritive value in proportion to their abstraction.

For the preservation of food there are three methods—viz., preservation by cold, preservation by the exclusion of air, and preservation by salting—for these see **ANTISEP-**

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rices). The first is of comparatively limited application. the second, known as Appert's method, has been successfully used in the English navy for many years; the chief objection is its expense: the third method injures, as we have already seen, the character of the meat, and renders it both deficient in nutritive materials, and actually injurious if it forms a principal and continuous article of diet. To the three foregoing methods must be added preservation by smoking, preservation with sugar, and with vinegar, and preservation by drying. It is well known that meat suspended in smoke loses its tendency to putrefy, the substance from which the smoke derives its antiseptic property being creasote, or some allied body. Smoked meat acquires a peculiar taste, a dark color, and a somewhat hard consistence; but it retains all its nutritive constituents, and is thus preferable to salted meat. Sugar and vinegar are employed in the preservation chiefly of vegetable products. The most important mode of preserving articles of food, whether animal or vegetable, is by direct drying. Meat is cut up into small slices about a quarter of an inch thick, and vegetables into smaller pieces; they are steamed at high temperature, to coagulate the albumen; and they are then completely desiccated by exposure to a current of very hot dry air. At the conclusion of the process, the slices of meat are quite hard, and present a shrivelled appearance. Dr. Marcet (*On the Composition of Food*, 1856, p. 174) speaks in high terms of this method, which he had himself seen in operation in Paris. 'Food thus preserved,' he says, 'whether it be animal or vegetable, has the advantage (1) of remaining in a fresh condition, though freely exposed to the atmosphere for a great number of years, and (2) of being reduced to one-fifth of its original bulk from its having lost all its water.' He adds, that the preserved vegetables resume their bulk when boiled in water, and that they so completely retain their aroma, that it is often difficult to distinguish between soups made with them, and others prepared with fresh vegetables.

The adulteration of food of almost every kind is very common.—

Wheat-flour is frequently adulterated with one or more of the following substances—flour of beans, Indian corn, rye, or rice, potato-starch, alum, chalk, carbonate of magnesia, bone-dust, plaster of Paris, sand, clay, etc. The organic matters—the inferior flours and starch—do little or no serious harm; but most of the inorganic matters are positively injurious, and of these, alum (one of the commonest adulterations) is the worst. The beneficial action of wheat-flour on the system is in part due to the large quantity of soluble phosphates which it contains. When alum is added, these phosphates are decomposed in the process of making bread, the phosphoric acid of the phosphates uniting with the alumina of the alum, and forming an insoluble compound: the beneficial effect of the soluble phosphates is thus lost.—*Arrow-root* is adulterated with potato-flour, sago, starch, etc. Out of 50 samples examined by Dr. Hassall, 22 were adulterated, and in 10 of the samples

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there was scarcely a particle of the genuine article.—*Sugar* of the inferior kinds is occasionally adulterated with flour, gum, starch-sugar, etc. It is oftener, however, impure than intentionally adulterated.—*Pepper* is adulterated with linseed, mustard seed, wheat-flour, etc.—*Cayenne Pepper* is adulterated with red lead, vermilion, red ochre, brick-dust, common salt, turmeric, etc.—*Mustard* is largely adulterated with ordinary and pea flour, linseed meal, and turmeric; and a little chromate of lead is sometimes added to improve the color. Dr. Hassall submitted 42 specimens of mustard to examination; all contained wheat-flour and turmeric.—*Ginger* is frequently adulterated. Out of 21 samples, Dr. Hassall found that 15 contained various kinds of flour, ground rice, Cayenne pepper, mustard husks, and turmeric, which in most cases formed most of the so-called ginger.—*Mixed spices* were found by Dr. Hassall (16 out of 26 samples) to contain sago-meal, ground rice, wheat-flour, etc.—*Curry powder* (q.v.) was found by Dr. Hassall to be very commonly adulterated, only 7 specimens out of 26 being genuine. In 8 of the samples red lead was detected. The frequent use of curries may thus often give rise to the disease known as lead-palsy.—*Tea* undergoes numerous adulterations, both by the Chinese and in this country: see Hassall's *Adulterations Detected*, pp. 65-104.—*Coffee*, in its powdered form, is not merely largely adulterated with chicory, but additionally with roasted grain, roots, acorns, saw-dust, exhausted tan (termed croats), coffina (seeds of a Turkish plant), burnt sugar, and (worst of all) baked horses' and bullocks' liver. In the *Quarterly Journal of the Chemical Society*, 1856, Apr., is an excellent Report by Messrs. Graham, Stenhouse, and Campbell on the mode of detecting vegetable substances mixed with coffee. Even whole roasted coffee is not safe from adulteration, a patent having been actually taken out to mold chicory into the form of coffee-berries.—*Cocoa* and *Chocolate* are adulterated with flour, potato-starch, sugar clarified, mutton-suet, and various mineral substances, such as chalk, plaster of Paris, red earth, red ochre, and Venetian earth, the last three as coloring matters.

For the adulterations of *beer*, *wine*, and *spirits*, see the various titles.

Vinegar is adulterated with water, sulphuric acid, burnt sugar, and sometimes with chilies, grains of paradise, and pyroligneous acid. The English law allows one part of sulphuric acid to 1000 of vinegar, with the view of preserving it from decomposition, but Dr. Hassall found that in many cases three or four times the legal amount was present. It appears from evidence taken before the British parliamentary committee on adulterations, that arsenic and corrosive sublimate are not uncommon ingredients in vinegar.—*Pickles* are adulterated with copper. Dr. Hassall analyzed 16 different pickles for copper, and discovered that poisonous metal more or less abundantly in all of them; 'in three, in a very considerable quantity; in one, in highly deleterious amount; and in two, in poisonous amount.—*Preserved fruits* and *vegetables* (especially goose-

berries, rhubarb, greengages and olives) also are often contaminated largely with copper. In these cases, the copper, if in considerable quantity, may be easily detected by placing a piece of polished iron or steel in the suspected liquid for 24 hours, previously adding a few drops of nitric acid: the copper will be deposited on the iron. Or ammonia may be added to the fluid in which the pickles or fruit were lying, when, if copper is present, a blue tint is developed. We should be suspicious of all pickles, olives, preserved gooseberries, etc., with a particularly bright green tint.

Milk is usually believed to be liable to numerous adulterations, such as flour, chalk, mashed brains, etc. It appears, however, from Dr. Hassall's researches on London milk, that, as a general rule, water is the only adulteration. The results of the examinations of 26 samples were, that 12 were genuine, and that 14 were adulterated, the adulteration consisting principally in the addition of water, the percentages of which varied from 10 to 50 per cent. For the means of the testing the purity of this fluid, see MILK.

In conclusion, as a general rule, adulterations of an organic nature, such as flours and starches of various kinds, are best detected by the microscope; while chemical analysis is usually necessary for the detection of mineral adulterations. Dr. Hassall's *Adulterations Detected*, is a cyclopedia on this subject.

FOOD—as derived entirely from the vegetable and animal kingdoms.—Of animals used for food by man, the catalogue is very large. Savages, impelled by hunger, and unrestrained by any of those opposing considerations always powerful with civilized man, eagerly devour almost every animal on which they can lay their hands, vertebrate or invertebrate, whether in a fresh state or far gone in putrefaction.

There is no vertebrate animal of which the flesh is known to be poisonous or positively unwholesome, except some species of fish found chiefly in tropical seas. Of vertebrate animals, every class—Mammals, Birds, Reptiles, and Fishes—affords common and esteemed articles of food. Of mammals, those principally used for this purpose are the herbivorous quadrupeds, and, most of all, the ruminants, of some of which the milk also is much employed. The flesh of some of the pachyderms also is used particularly the hog; and of some of the rodents, as the hare, rabbit, capybara, etc.—though the idea of eating others of the rodents, as mice and rats, would be rejected with disgust by nearly all civilized nations. The flesh of monkeys is eaten in some parts of the world, though a strong aversion to it is general in civilized lands, probably on the ground of the animal's resemblance to the human form; for travellers who have been compelled to eat monkey-flesh, declare it very good. The flesh of whales and other ordinary Cetacea is scarcely used except by rude tribes; though that of porpoises was formerly in great request in England, especially during Lent—the porpoise passing for a fish. The flesh of the herbivorous Cetacea, as the Manati and dugong of tropical seas, is esteemed. The flesh of some of the herbivorous marsupial quadrupeds, as the kangaroo, is eaten; but

that of the carnivorous marsupials and of carnivorous quadrupeds generally is rejected.—The same general remark applies to birds: the flesh of birds of prey is rank, coarse, and unfit for human food; but that of almost all birds which feed on leaves, seeds, and other vegetable substances, or on insects, worms, mollusks, etc., is good for eating. Web footed birds, particularly the *Anatidæ*, and gallinaceous birds (including pigeons), are more extensively used than any others; but birds of other orders are also eaten; and some of the small *Insessores*, as ortolans, becfins, larks, etc., are brought to market as delicacies.—Of reptiles, one order—that of Ophidian reptiles, or serpents—affords food only to savages; but some of the Chelonian reptiles—turtles—are in high esteem; the Batrachian order contains the frogs, which find a place on the most luxurious tables in some countries of Europe; and to the Saurian order, or lizard-like reptiles, belong species—as the iguanas of S. America, creatures of uncouth appearance—which, however disgusting as food to Europeans in general, are esteemed by some a delicacy. The eggs of turtles and iguanas are used for food, as well as those of many kinds of birds. Of mammals, birds, and reptiles, the parts chiefly used for food are the muscles or flesh, and the fat; but other parts of some animals are used, as kidneys, lungs, livers, stomachs of ruminants (*tripe*), gizzards of birds, etc.—Very many kinds, both of cartilaginous and bony fishes are excellent for food, and they belong to many different families.

Of invertebrate animals, some mollusks are generally used, e.g. oysters, mussels, and the snails of Italy. Comparatively few mollusks, however, form articles of human food. The same remark applies to crustaceans, though crabs, lobsters, cray-fish, prawns, and shrimps are well-known exceptions. It may almost be said that no articulated animals of any other class are used for food except by savages, the occasional use of locusts and of the larvæ of some coleopterous insects (gru-gru worms, etc.), scarcely requiring a qualification of the statement. And of the radiated animals, the same general statement may be made; the *Bêche-de-mer*, or *Trepang*—of which, however, the use is almost confined to the Chinese—being the only considerable exception.

Honey, though collected and modified by insects, is a product rather of the vegetable than of the animal kingdom. The same remark applies to a very different substance, the sea-weed gelatine of which certain swallows of the East India make their edible nests.

All the great divisions of the vegetable kingdom yield food for man—phanerogamous, however, much more largely than cryptogamous plants. Of the latter, the mosses and *hepaticæ* contain no species used for this purpose; the same almost may be said of lichens, notwithstanding the tripe-de-roche and Iceland moss; but numerous species of *Algæ* and of *Fungi* are edible: and a few ferns supply unimportant articles of food. Of phanerogamous plants, it is perhaps impossible to say whether the endoge-

nous or the exogenous are most important in this respect, notwithstanding the place of the cereal grasses among the former. The plants yielding food are also distributed among many natural orders, though some orders, as *Gramineæ*, *Leguminosæ*, and *Cruciferae*, contain a large number of the most useful species. The parts of plants which yield food are very various: the roots and tubers, bulbs, etc., of some; the stems of others; leaves; flowers; the fleshy part of fruits; the seed, etc. The part which man appropriates to himself is used either uncooked, or cooked; and sometimes other previous preparations are necessary, as the grinding of corn, etc. Except in the case of ferns, when the cryptogamous or acotyledonous plants are used for food, the whole plant is used, e.g. mushrooms, carrageen, Iceland moss. Sometimes no part of the plant is itself fit for use, but it contains some substance which is, and which man extracts by suitable processes, as in the case of arrow-root, sago, and other kinds of starch, sugar, etc.

The first place among articles of vegetable food must be assigned to *corn* or *grain*, the seeds of the *Cereal*ia (q.v.). The next place, perhaps, belongs to the potato and yam, after which are the banana, cassava or mandioc, and the different kinds of pulse.

Regarded botanically, the articles of food are—1. *Roots*, properly so called, of which the turnip, carrot, parsnip, beet and mangold, cocco or eddoes, are among the most important; but the number of esculent roots and of roots yielding articles of food, is very great.—2. *Tubers*, of which the potato, yam, and batatas or sweet-potato, are most important, with the cassava or mandioc and the arrow-root as yielding starch; but of which many others also are used, as the melloco (*ullacus*), the oca (*oxalis*), the earth-nut, etc.—3. *Rhizomes*, or root-stocks, of which some are simply boiled, while others are valued chiefly for the starch (arrow-root, etc.) which they yield.—4. *Bulbs*, as those of the onion, garlic, shallot, etc., the most important are alliaceous.—5. *Stems*, which, in some cases, are eaten with the leaves, whether as salads or boiled vegetables; but of which some are more important as yielding sago and other kinds of starch: the eatable part of asparagus is a stem beginning its growth, and the same statement applies to some other plants; the eatable part of kohlrabi is a peculiar swelling of the stem.—6. *Leaves*, and leaf-buds, as those of kale and cabbage, with other *greens* of all sorts, spinach, lettuce and all the other salads; the terminal buds of palms (palm-cabbage), etc.—7. *Flowers*, and adjoining parts, as in cauliflower and artichoke.—8. *Fruit* (exclusive of seeds), used either as a principal article of food, as in the case of the banana, and, to some extent, of gourds, or more generally as an article of luxury: see FRUIT.—9. *Seeds*, of which the most important are those of the cereal grasses (see CEREALIA); with which must be mentioned those of buckwheat, quinoa, the lotus of the Nile and other water-lilies, the nelumbo, the water chestnut and other species of *Trapa*, many kinds of *pulse*, as peas, beans, lentils, kidney-beans, chick-peas, etc., and nuts of many kinds, some of which, as the chestnut and cocoa-nut, afford in some countries substan-

tive and important articles of food, while the greater number are articles of occasional use and of luxury; there are other seeds capable of being used, and occasionally used as food.

Sugar, which has place among important articles of food, is obtained from the juice of stems, as of the sugar-cane, some palms, and the sugar-maple, and of roots, as of the beet, etc. Alcoholic beverages are obtained from vegetable substances and juices which contain sugar, or which, by some artificial process, are, in the first instance, converted into sugar; as the juices of fruits (the grape, apple, etc.), the juices of stems (the sugar cane, palms, etc.), the juices of roots and tubers (beet-root, potatoes, etc.), and the seeds of the cereal plants (barley, rice, etc.).

Besides the substantive articles of food, and beverages more or less generally used, there are very many condiments, obtained from the vegetable kingdom, and of which the botanical sources are almost equally various, as mustard, pepper, ginger, cloves, capers, etc.

FOODS, CONCENTRATED FOR ANIMALS: materials containing nutritive elements in much larger proportion than that in which they exist in the ordinary substances used for feeding. Practically, animals are machines for the performance of labor or the production of flesh, milk, or other valuable substances. The food which they eat furnishes the means for carrying on these processes. The use of concentrated F. gives quicker and larger returns than can be secured from bulky and comparatively innutritious material, as the digestive capacity of animals proves inadequate to extract from the latter substances alone sufficient nourishment to give the most profitable results.

It is necessary to exercise constant care in the use of concentrated F., as an excessive quantity will cause indigestion and various inflammatory diseases, often resulting in death. It is also imperative to use these F. in connection with more bulky material. A certain proportion of innutritious matter is required to keep the animals in health or even, for any long period, to maintain life. Horses, cattle, and sheep require hay or straw; and the concentrated F. supplied to hogs must be diluted with some less nutritious matter. It is also found highly beneficial to use a mixture of two or more concentrated F. rather than any one alone; this is true particularly in the case of cows, heavily fed for production of milk. Thus wheat-bran and Indian meal usually give much better results than either of them separately, and the use of at least an equal quantity of bran with cotton-seed meal may be regarded as almost a necessity. At first concentrated F. should be given very sparingly, the quantity being gradually increased as the animals become accustomed to them.

Among the principal concentrated F., used in this country, are cotton-seed meal, wheat bran or shorts, rye meal, Indian meal, and oats, either ground or whole. Of these all, except oats are fed largely to cows kept for dairy purposes (see **DAIRY**). Indian meal is one of the standard F. for fattening animals and for those which labor, while oats are fed principally to horses, though many are given to young calves, lambs, and sheep.

The use of concentrated F. has rapidly increased during the past few years, and has proved a source of great profit to the farmer and dairyman. It is of special benefit on dairy farms at the East, where grain growing is expensive and somewhat difficult. Where concentrated F. is purchased, the land can be used principally in the production of hay. This, fed in connection with the material that is bought, increases the quantity of manure which, by its application to the land, renders the soil more fertile, and insures the growth of still larger crops. These in turn admit the keeping of a larger number of animals. The increased yield of milk will nearly or quite pay the expense of the concentrated F., the land will increase in value and productiveness and the income from the farm will be largely and permanently increased.

In connection with the plan of associated dairying (see DAIRY), the use of concentrated F. has proved of immense benefit to the country at large as well as to the individual feeder. The great and constantly growing demand for dairy products could hardly be met by any other method, and the quality of the products is much better than could be obtained if coarse fodder alone were used. For working animals a certain quantity of the concentrated F. is a necessity if their labor is to be profitable, while for fattening purposes they are simply indispensable.

FOOL, n. *fól* [F. *fol*—from mid. L. *follus*, one who grimaces—from L. *follis*, a pair of bellows, in mid. L. a grimace: W. *ffol*, foolish, vain: OF. *folier*, to err or wander (see FOLLY)]: one who acts absurdly or unwisely; a person who is void of reason or understanding; a person of a weak intellect; a jester (see COURT-FOOL): V. to treat with contempt; to disappoint; to cheat; to trifle; to toy. FOOL'ING, imp.: N. act of playing the fool. FOOLED, pp. *fôld*, deceived; imposed on. FOOL'ISH, a. absurd; marked with folly; silly; indiscreet. FOOL'ISHLY, ad. *-lî*, weakly; without understanding. FOOL'ISHNESS, n. want of wisdom or judgment. FOOL'ERY, n. *-ér-î*, FOOL'ERIES, n. plu. *-îz*, habitual folly; that which is foolish; attention to trifles. FOOLHARDY, a. *-hâr'dî*, daring without judgment; madly rash; headlong. FOOLHAR'DINESS, n. FOOL-FISH, a name given to a fish of the genus *Monacanthus*, one of the *Balistidae*, from its wriggling along with its body sunk and its open mouth just on the surface of the water. FOOL'S-CAP, or FOOLSCAP, n. a large folio writing or printing paper, so called from being formerly marked with a fool's cap and head. *Note.*—FOOLSCAP, as applied to a size of paper, is said to be nothing more than a popular adaptation, from the unknown to the known, from similarity of sound of the It. *foglio-capo* (head-leaf), a folio-sized sheet. FOOL'S ERRAND, the pursuit of what cannot be found; an impossible enterprise. To PLAY THE FOOL, to behave like one devoid of understanding. To MAKE A FOOL OF, to cause to appear ridiculous; to disappoint. FOOL'S PARADISE, the state or condition of mind into which one is brought to believe highly improbable and absurd things to their own advantage, and to the gratification of their vanity; unlawful pleasure. To FOOL ONE OF HIS MONEY, to cheat.—SYN.

FOOLAHS—FOOLS.

of 'foolish': irrational; preposterous; shallow; brainless; imprudent; unwise; simple; ridiculous; trifling; vain; incautious; sinful; wicked; contemptible; despicable.

FOOLAHS, or FELLATAH: see FULAHS.

FOOLS, FEAST OF: a pagan festival of absurdity, perpetuated in many Christian countries for a long period. The Romans kept the festival of Saturn, in Dec., as a time of general license and revelry. During the brief season of the Saturnalia (q.v.), the slave reclined on his master's seat at table, the master waited upon his slave, and society, for the moment, seemed turned upside down. The grotesque masquerade survived the pagan creed which gave it birth, and not only kept its place among the Christians, but in the face of solemn anathemas of fathers and councils, even found its way into the ceremonial of the Christian Church. It was called, at different times and places, by many different names, but has latterly come to be known as the Feast of Fools (*Festum Fatuorum*, *Festum Stultorum*).

The circumstances of the observance were almost infinitely varied, but it was everywhere marked by the same spirit of broad boisterous drollery, and coarse but not ill-natured caricature. The donkey played such a frequent part in the pageant that it was often called the Feast of Asses (*Festum Asinorum*). In some places, the ass of Balaam was figured; in others, the ass which stood beside the manger in which the infant Savior was laid; elsewhere, the ass on which the Virgin and Child fled to Egypt, or the ass on which Jesus rode into Jerusalem. In every instance, there was more or less attempt at dramatic representation, the theatre being generally the chief church of the place, and the words and action of the drama being often ordered by its book of ceremonies. Several rituals of this sort are still preserved. That which was in use at Beauvais, in France, has a rubric ordering the priest when he dismisses the congregation to bray three times, and ordering the people to bray three times in answer. As the ass was led toward the altar, he was greeted with a hymn of nine stanzas, of which the first runs thus:

Orientis partibus,
Adventavit Asinus,
Pulcher et fortissimus,
Sarcinis aptissimus.
Hé, sire Ane, hé!

[From the regions of the East—
Blessings on the bonny beast!—
Came the Donkey, stout and strong,
With our packs to pace along.
Bray, Sir Donkey, Bray!]

Where the ass did not come upon the stage, the chief point of the farce lay in the election of a mock pope, patriarch, cardinal, archbishop, bishop, or abbot. These mimic dignitaries took such titles as 'Pope of Fools,' 'Archbishop of Dolts,' 'Cardinal of Numskulls,' 'Boy Bishop' (q.v.), 'Patriarch of Sots,' 'Abbot of Unreason,' and the like. On the day of their election, they often took possession of the churches, and even occasionally travestied the performance of the church's highest office, the mass, in the

FOOL'S PARSLEY.

church's holiest place, the altar. In some convents, the nuns disguise themselves in men's clothes, chanted mock services, and elected a 'little abbess,' who for that day took the place of the real abbess.—The Feast of Fools maintained itself in many places till the Reformation in the 16th c. At Antibes, in the s. of France, it survived till 1644, when we have it described by an eye-witness in a letter to the philosopher Gassendi. The scene was, as usual, a church; the actors, dressing themselves in priests' robes turned inside out, read prayers from books turned upside down, through spectacles of orange-peel, using coal or flour for incense. amid a babblement of confused cries, and the mimic bellowings of cattle, and grunting of pigs.—The history of the Feast of Fools has been treated in several works; the best is the *Mémoire pour servir à l'Histoire de la Fête des Fous*, by Du Tilliot, (Lausanne 1741; reprinted Paris 1751 and again in the *Recueil des Cérémonies et Coutumes Religieuses de Tous les Peuples*, tome VIII. edit. Prudhomme, 1809).

FOOL'S PARSLEY (*Æthusa Cynapium*): umbelliferous plant, very common as a weed in gardens and fields in most parts of Europe, somewhat resembling parsley in its foliage and general appearance, so that serious accidents have oc-



1, Fool's Parsley, general umbel; 2, Common Parsley, leaf and general umbel;

a, partial umbel of fool's parsley; b, fruit of common parsley, c, flower of common parsley.

curred from its being mistaken for that herb; as it is a poisonous plant with properties somewhat resembling hemlock. With the curled variety of parsley, which is the preferable variety on all accounts, it cannot easily be confounded; and when in flower it may be known by its umbels wanting general involucre, and having partial involucre of three slender leaves hanging down on one side.

FOOT

FOOT, n. *fāt*, **FEET**, n. plu. *fēt* [Dut. *voet*; Icel. *fótr*; Dan. *fod*; Goth. *fotus*; Ger. *fuss*, a foot: Gr. *podēs*; L. *pēdēs*, feet]: the lower part, base, or bottom of anything; that on which any animal or thing stands; infantry soldiers; a lineal measure of 12 inches (see below); a step or pace; in *poetry*, the division of a line (see **METRE**: **VERSE**); in *music*, term denoting, as in poetry, a short melodic figure of notes with only one accent. Foot is also now beginning to be used in speaking of the pitch of sounds. The Germans have always used the word *Fusston* in representing the pitch of the different stops of an organ, such as *Principal* 16 F., 8 F., or 4 F., etc., which convenient practice has been introduced into English organs. The pitch of the stop is fixed according to the length of the lowest C. pipe (see **ORGAN**). **Foot**, v. to kick; to tread; to dance; to trip to music; in *OE.*, to settle; to tread; to hold with the foot. **Foot'ing**, imp.: N. a hold for the feet; a firm foundation; status or position; tread; walk; dance; entrance; support. **Foot'ed**, pp. **Foot'less**, a. without feet. **Foots**, n. plu. the settlings of oil, sugar, etc., at the bottom of a barrel. **Football**, a large ball for kicking (see below). **Foot board**, any support for the feet; the upright board at the foot of a bed. **Footboy**, a boy who attends in livery. **Foot Guards**, n. plu. the flower of the British infantry, and the garrison ordinarily of the metropolis, comprising three regiments, the Grenadier, Coldstream, and Scots Guards, in all seven battalions, and about 6,000 officers and men (see **GUARDS**). **Foothold**, space on which the foot may rest or tread securely. **Footfall**, a setting down of the feet. **Foot-lights**, the row of lights in the front of the stage of a theatre, and nearly on a level with it. **Footman**, a servant in livery; in *OE.*, a soldier who fights on foot. **Footmark**, a mark or track made by the foot. **Footnote**, a note of reference at the foot of a page. **Foot pace**, a slow step. **Footpad**, a highwayman on foot. **Foot plate**, the platform on which the engineman and fireman of a locomotive stand while attending to their duties. **Footpath**, a road for persons on foot. **Foot print**, in *nat. science* (see **ICHOLOGY**). **Foot rot**, ulcer in the feet of sheep (see below). **Foot-rule**, a measure of three feet. **Foot soldier**, one who fights on foot, the opposite of *horse-soldier*. **Footsore**, a. sore and worn at the feet. **Foot-stalk**, the stalk of a leaf, or of a flower. **Foot-step**, space traversed by a single step in walking; the putting down of the foot in walking; sometimes, a trace; impression left by a foot (see **FOOT-PRINT**). **Footstool**, that which supports the feet of one sitting. **Foot-valve**, the valve in the passage between the condenser and air-pump of an engine. **Afoot**, ad. stirring; taking action; in train. **On foot**, walking; the act of walking; in motion; action. **To foot it**, to engage in the dance. **To set on foot**, to originate; to set in motion. **On that footing**, on these grounds; on that basis. **Best foot foremost**, use all possible care by the exercise of your best powers. **Good footing**, standing well with. **To pay your footing**, among workmen, drink-money given in some shops by a new-comer or entrant. **To put one's**

FOOT.

FOOT INTO, to blunder into an unpleasant predicament; to interfere with vexatiously, officiously, or impertinently.

FOOT: member of the human or animal body used in standing, locomotion, etc. The *bones* of the F. in man, number 26, arranged in three natural groups—viz., the tarsal bones, which are the hindermost; the metatarsal bones, which occupy the middle portion; and the phalanges of the toes anteriorly. The tarsal bones, seven in number, are short and thick, and form the heel and the hinder part of the instep. The uppermost (see fig. 1) is called the *astragalus*, from its supposed resemblance to the dice used by the Romans. Above, it is articulated or is



Fig. 1.

The dorsal surface of the left foot:

1, the *astragalus*, its upper articular surface; 2, its anterior extremity, which articulates with (4) the scaphoid bone; 3, the *os calcis*, or heel-bone; 4, the scaphoid bone; 5, the internal cuneiform bone; 6, the middle cuneiform bone; 7, the external cuneiform bone; 8, the cuboid bone; 9, the metatarsal bones of the first and second toes; 10, 11, the first and second phalanges of the great toe; 12, 13, 14, the first, second, and third phalanges of the second toe.

jointed with the two bones of the leg, the *tibia* and *fibula*, and through these bones the whole weight of the body is thrown upon the two *astragali*. Behind, it is connected with and rests upon the *os calcis*, or heel-bone, the largest bone of the F. Immediately in front of it, and supporting it in this direction, is the *scaphoid* or boat-like bone. In front of the scaphoid bone are the three *cuneiform* or wedge bones; and on the outer side of the cuneiform bones and in front of the *os calcis*, is the *cuboid* bone. We see from the figure that the front row of tarsal bones is composed of

FOOT.

the three cuneiform bones on the inner side of the F., and of the cuboid bone externally. There are five metatarsal bones passing forward, one for each toe. Each cuneiform bone is connected with one, and the cuboid bone with two, of these metatarsal bones. Behind, they are close together, but in taking their forward direction, they diverge slightly from one another, and their anterior ends rest upon the ground, and form the *balls* of the toes. They constitute the forepart of the instep. The remaining bones are those of the toes, and are named the *phalanges*, each toe having three of these bones, excepting the great toe, which has only two. (A similar law holds for the bones of the hand, each finger having three phalanges, but the thumb only two).

The instep is composed of the seven tarsal and the five metatarsal bones, so arranged and connected (see fig. 2) as to form an arch from the extremity of the heel-bone to the balls of the toes. This is called the plantar arch, from *planta*, the sole of the foot. The astragalus forms the

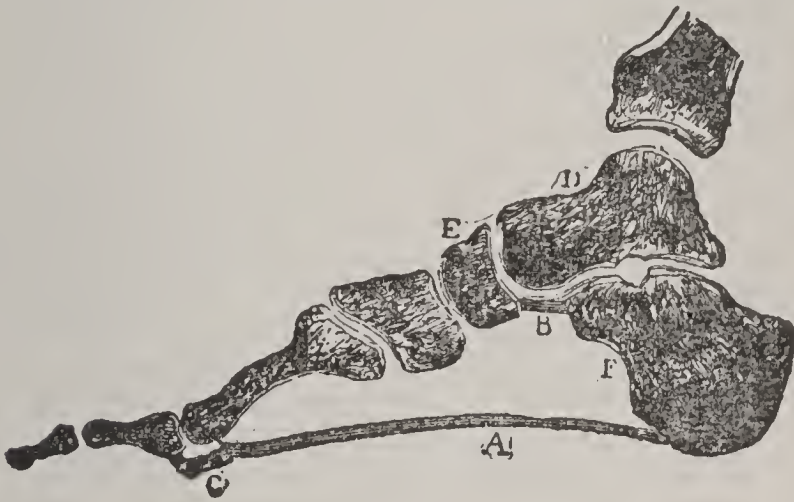


Fig. 2.

This figure represents a section through the lower end of the tibia, and through the astragalus D, the heel-bone F, the scaphoid bone E, the internal cuneiform bone, and the bones of the great toe: A represents the plantar ligament, and B the interior calcaneo-scapoid ligament passing from the heel-bone, F, to the scaphoid, E; C is one of two small bones called sesamoid bones, usually found at the ball of the great toe. The lines show the disposition of the laminæ or plates of which the various bones are composed. The clear line along the contiguous edges of the bones represents the cartilage.

summit or keystone of this arch, and transmits the weight which it receives posteriorly to the heel, and anteriorly to the balls of the toes. This figure exhibits the arrangement of the fibres and laminæ in the interior of the bones, and shows that the greater number of them, in each bone, follow the directions of the two pillars of the arch, and thus give the greatest strength to the bones in the directions in which it is most required.

The bones, where they articulate with one another, are covered with a moderately thick layer of highly elastic cartilage, and by this, together with the very slight movements of which each bone is capable, a degree of elasticity

is given to the F., and consequently to the step, which would be altogether wanting if the plantar arch were composed of a single mass of bone. This elasticity is far greater in the anterior pillar of the arch, which is composed of five comparatively long bones sloping gradually to the ground, than in the posterior pillar, which is short, narrow, and composed of a single bone, which descends almost vertically from the ankle to the ground. Hence, in jumping from a height, we always endeavor to alight upon the balls of the toes, and thus break the shock which we should feel if, by accident, we descended upon the heels.

A reference to any standard work on anatomy (see, e.g., Gray's *Anatomy*, pp. 178-184) will show that the ligaments which unite these bones to one another, and by which the movements of each bone upon the others are limited, are very numerous. We notice two of these ligaments, selecting those whose action is especially obvious in maintaining the shape of the plantar arch. One, the *plantar ligament* (A, fig 2), of great strength, passes from the under surface of the heel-bone, near its extremity, forward to the ends of the metatarsal bones, according to Dr. Humphry (*The Human Foot and the Human Hand*, 1861, p. 25). Most anatomists do not trace it quite so far forward. 'In other words' (we quote from Dr. Humphry's vol., from which the diagrams also are taken), 'it extends between the lowest points of the two pillars of the arch, girding or holding them in their places, and preventing their being thrust asunder when pressure is made upon the key-bone (D), just as the 'tie-beam' of a roof resists the tendency to outward yielding of the sides when weight is laid upon the summit. The ligament, however, has an advantage which no tie-beam can ever possess, inasmuch as a quantity of muscular fibres are attached along the hinder part of its upper surface. These instantly respond to any demand that is made upon them, being thrown into contraction directly the F. touches the ground; and the force of their contraction is proportionate to the degree of pressure which is made upon the foot. In addition to its office of binding the bones in their places, the ligament serves the further purpose of protecting from pressure the tender structures—the blood-vessels, nerves, and muscles—that lie above it in the hollow of the foot. Another very strong ligament (B, in the figure) passes from the under and fore part of the heel-bone (F) to the under parts of the scaphoid bone (E). It underlies and supports the round head of the astragalus, and has to bear a great deal of the weight transmitted to that bone from the leg. It possesses a quality which the ligament just described, and most ligaments have not—viz., elasticity. This is very important, for it allows the head of the key-bone (D) to descend a little, when pressure is made upon it, and forces it up again when the pressure is removed, and so gives very material assistance to the other provisions for preventing jars, and for giving ease and elasticity to the step.'—Humphry, *op. cit.*, pp. 25, 26.

The spot over which the ligament B extends is the weakest in the F., the astragalus being there unsupported by any

FOOT.

bones; additional support is, however, afforded when most required, by the tendon of a strong muscle, the *posterior tibial* (fig. 3, B), which passes from the back of the tibia (the chief bone of the leg) round the inner ankle, to be inserted into the lower part of the inner surface of the scaphoid bone. It frequently happens that the astragalus, being either insufficiently supported, or being overweighted, descends slightly below its proper level, causing a lowering of the arch, and a flattening of the sole of the foot. The defect, when slight, is known as 'weak ankle;' when more decided, it is termed 'flat-F.;' and in extreme cases, the bone may descend to such an extent as even to render the inner side of the F. convex, when it naturally should be concave. This deformity is of great practical importance. There are two periods of life at which *flat-foot* is especially liable to occur: 1st, in infancy, if the child be put upon its feet before the bones and ligaments—especially the latter—are strong enough to bear its weight; and 2dly, about the age of 14—a period at which growth is very quick, and the body consequently attains considerable and rapid

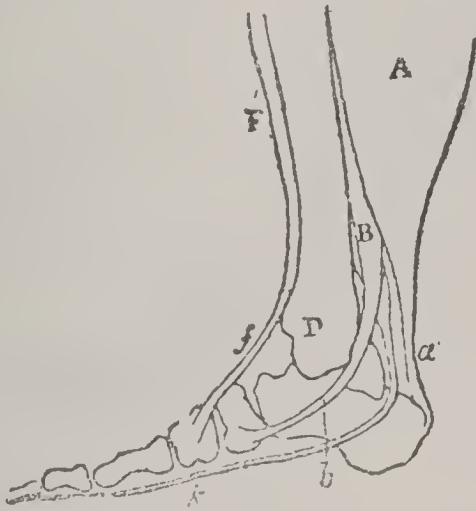


Fig. 3.

This figure represents some of the muscles and tendons seen on the inner side of the leg and foot.

A, the gastrocnemius and soleus muscles, forming the muscles of the calf; a, the Tendo Achillis, B, the posterior tibial muscle; b, its tendon; D, the inner ankle; F, the anterior tibial muscle, attached above to the front of the tibia below to the internal cuneiform bone; k, the flexor tendon of the great toe.

augmentation of weight. If young persons of this age are obliged to be a great deal on their feet, and perhaps additionally to carry weights (as, for example, butchers' and bakers' boys, and young nursemaids), the chances that flat-foot will occur are increased.

Noting now the movements of the F. on the leg, we see a striking combination of variety of movement with general security. This combination is effected by the harmonious action of three *joints*, each of which acts in a direction different from the others. The first of these joints is the ankle-joint, formed by the bones of the leg—the tibia and fibula—above, and the astragalus below. By this joint, the F. is bent or straightened on the leg. The second joint

FOOT.

is between the astragalus and the heel-bone, and it permits the F. to be rolled inward or outward; while the third joint is between the first and second row of tarsal bones—namely, between the astragalus and heel-bone behind, and the scaphoid and cuboid bones in front, and allows the degree of curvature of the plantar arch to be increased or diminished within certain limits. The following is the order in which the movements of these three joints occur: the raising of the *heel* (by the first joint) is accompanied by a rolling of the F. *inward* (by the second joint), and by an increased *flexure* of the plantar arch (by the third joint); and the raising of the *toes* is accompanied by a rolling of the F. *outward* and a *straightening* of the sole. See Humphry, *op. cit.*, p. 42.

The joints, however, merely allow of movements; they do not effect them; this is the special function of the *muscles*; and each of the three movements above indicated is effected by special groups of muscles. The first series of

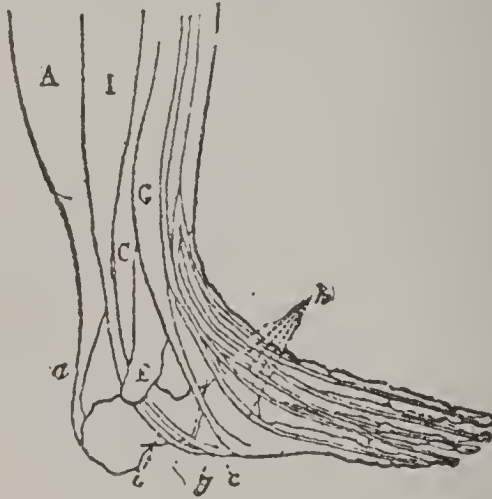


Fig. 4.

This figure represents some of the muscles and tendons on the outer side of the leg and foot.

E, lower end of fibula, forming the outer ankle: C, the short fibular muscle, attached above to the fibula, and below by its tendon (c) to the outer metatarsal bone; I, the long fibular muscle, its tendon (i) running behind the outer ankle and under the instep to the metatarsal bone of the great toe: G, the anterior or third fibular muscle, attached above to the fibula and below by its tendon (g) to the outer metatarsal bone; h, the extensor tendons of the toes.

movements is mainly effected by three muscles: (1) the *muscles of the calf* (fig. 3, A), attached above to the bones of the thigh and leg, and below by the *Tendo Achillis* to the heel-bone; (2) the *posterior tibial* (fig. 3, B), attached above to the tibia, and below by its tendon to the scaphoid bone, and (3) the *short fibular* (fig. 4, C), attached above to the fibula, and below by its tendon to the outer metatarsal bone. The calf-muscles, whose tendon is inserted into the heel-bone, are large and very powerful, for in raising the heel, they have to raise the weight of the body. The other two muscles, the posterior tibial and the short fibular, turn round the inner and the outer ankle respectively, and are inserted into the inner and the outer edges of the instep;

FOOT.

the former being attached to the scaphoid, and the latter to the outer metatarsal bone. They not only assist to raise the ankle, but also support it laterally. The muscle whose tendon is on the inner side of the F. (the posterior tibial), effects the two movements which are associated with the raising of the heel-bone, namely, the turning of the F. inward, and the increased flexure of the arch.

The second series of movements—the raising of the toes, the turning of the foot outward, and the straightening of the sole—are effected by two muscles, the *anterior tibial* (fig. 3, F) and the *third fibular* (fig. 4, G), whose tendons pass, one in front of the inner ankle, and the other in front of the outer ankle, to the corresponding edges of the instep, and are inserted into the internal cuneiform and the outer metatarsal bones. These muscles are direct flexors of the tarsus upon the leg; the former raising the inner, and the latter the outer border of the foot.

Another point in the anatomy of the F. that requires notice, is the mode of union of the metatarsal with the tar-

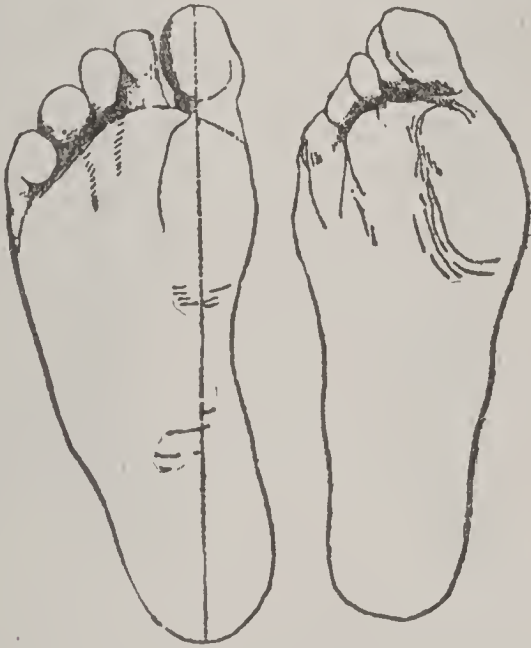


Fig. 5.

Fig. 6.

sal bones. In these joints in the fourth and fifth toes a slight revolving motion can take place, which probably enables the outer metatarsals to adapt themselves to inequalities of the ground, and to equalize the distribution of the weight which is thrown upon the F.; while, in the corresponding joints of the three inner toes, scarcely any motion can occur—a provision by which additional strength is given to the inner side of the F, on which the weight of the body most directly falls.

The skin of the sole is very tough and strong; and intervening between it and the bones and long plantar ligament is a thick pad of fat, which acts the part of an air or water cushion in defending the adjacent parts from injurious pressure, and in deadening the jars and shocks that would otherwise be felt in leaping, etc.

FOOT.

In connection with the structure of the F., the subject of shoes is important. The shape of the sole of the natural F. is shown in fig. 5, while the shape after the prolonged use of a badly made shoe is shown in fig. 6. In the F. in its normal state, the great toe is seen to be free from the others, and the line of its axis prolonged backward, passes through the centre of the heel; while in the F. distorted by the use of the shoe, the line of the great toe is quite altered, and the toes generally—not being able to find room side by side—overlap each other, and lose their separate and individual actions; corns, bunions, and ingrowing toe-nails being the natural consequence of this maltreatment. Prof. Meyer, of Zurich, has drawn attention to the bad treatment which the F. receives from ordinary shoemakers, in a pamphlet, translated by Mr. Craig, and entitled *Why the Shoe Pinches; a Contribution to Applied Anatomy*. He especially points out that the great toe should be allowed to



Fig. 7.
A shoe designed by Dr. Meyer,
the dotted outline being the
usual shape.



Fig. 8.
Foot of Gorilla.

have its normal position, and this can be done by making the inner edge of the sole incline *inward*, instead of *outward*, from the balls of the toes. The accompanying figure (7) gives the outline of the shoe designed under Dr. Meyer's superintendence, and shows the difference between it and the usual shape; the latter being indicated by the dotted outline. Dr. Humphry, from whose admirable work much of this article is drawn, while fully according in Meyer's views, additionally protests against high heel-pieces, as tending to make the step less steady and secure, to shorten it, and to impair the action of the calf-muscles; a high heel-piece, moreover, places the forepart of the F. at a lower level than the heel; the weight is thus thrown too much in the direction of the toes and they are thrust forward and cramped against the upper leather of the shoe.

FOOT.

For WALKING, RUNNING, and JUMPING, see GYMNASTICS.

If we compare the human F. with the feet of other mammals, we find that it presents certain peculiarities, all of which have reference to man's erect posture. The chief peculiarities are—1. The greater relative size of the tarsal bones, as compared with the other bones of the F., and the more perfect formation of the plantar arch, which is higher and stronger than in any of the lower animals. Strength and elasticity are thus combined in the human F. in the highest degree. 2. The great toe is remarkable in man for its size and strength, and for the firm manner in which its metatarsal bone is joined to the other bones, so as to render it the main support to the foot. 3. If we compare the human F. with that of the gorilla or any other anthropomorphous ape, we see that the toes are short and small in man in the relation to the other parts of the F., while in the gorilla the toes form the greater part of the foot. Indeed,



Fig. 9.—Horse.



Fig. 10.—Ox.

a reference to fig. 8 shows that in this animal (and the same is the case in all the *genera* of apes and monkeys) the organ in question is rather a *hand* than a *foot*; hence the term *quadrumanous*, as applied to this class of animals. There is scarcely any plantar arch, and the weight of the body bears chiefly on the outer edge of the F.; the digits are long and strong, and the inner one diverges so as to form a thumb rather than a great toe.

It remains to notice some of the most marked varieties of form which the bones of the F. present in mammals. In the following group of figures, the same letters are attached to the same bones. Thus, *a* marks the astragalus; *cl*, the calcaneum or heel-bone (the posterior projection of which forms the hock of the horse); *s*, the scaphoid; *b*, the cuboid; *ce*, the ecto-, or outer, *em*, the meso-, or middle, and *ci*, the ento-, or internal cuneiform. Now, as a general rule in all

mammalia, the ecto-cuneiform supports the third or middle of the five toes when they all are present, the meso-cuneiform the second, and the cuboid the fourth and fifth. Bearing in mind this law, we see that the large bone in the horse, known as the cannon-bone, which is articulated to the ecto-cuneiform, *ce*, is the metatarsal of the third toe, to which are articulated the three phalanges of that toe, the last phalanx, 3, being expanded to form the hoof. The small bone (not shown in the figure), popularly known as the splint-bone, and articulated to the meso-cuneiform, is the rudimentary or stunted metatarsal of the second toe, 2, and the outer splint-bone, articulated to the cuboid, is the rudimentary metatarsal of the fourth toe, 4; so that in the horse there is only one toe, the third, sufficiently developed to reach the ground, with mere traces of a second and fourth toe on either side.

In the F. of the ox, the cuboid, *b*, is relatively larger than in the horse, and is equal in size to the ecto-cuneiform, *ce*. The cannon-bone articulates with both these tarsal bones, and hence answers to the metatarsal bones of both the *third*



Fig. 11.
Rhinoceros.



Fig. 12.
Hippopotamus.



Fig. 13.
Elephant.

and *fourth* digits; it is accordingly found to consist of two distinct bones in the foetus; and in the adult it is divided internally into two cavities, and its original separation is marked out by an external elongated ridge. At the lower end are two distinct joints for the phalanges of the third and fourth toes. While in the horse there are the rudiments of the *upper* part of two toes (the second and fourth), in the ox there are the rudiments of the *lower* parts or phalanges of two toes (the second and fifth), forming the 'spurious hoofs,' and marked 2 and 5 in the figure. In the rhinoceros there is one principal toe (the third), as in the horse, with the second and fourth toes in a less developed state; while in the hippopotamus there are two principal toes (the third and fourth), as in the ox, with the second and fifth toes not fully developed. In the elephant, there is a fifth digit added, answering to the human great toe, and articulating with an ento-cuneiform bone, so that in the F. of this animal are all the bones occurring in the human foot.

FOOT—FOOT-BALL.

Prof. Owen, from whose works these comparisons are drawn, concludes from these and similar observations that the course of the simplification of the five-toed foot is, first, a diminution and removal of the innermost toe; next of the outermost; then, of the second; lastly, of the fourth; the third or middle toe being the most constant and (in the lower animals) most important of the five.

FOOT: the most common unit of lineal measure all over the world. It was evidently taken originally from the length of the human foot, and as that varies in length, so does the measure; each country, and at one time each town, having a F. of its own. The three foot-measures that occur most frequently are the Paris F., or *pied de roi*, the (German) Rhenish F., and the English. Compared with the French *mètre* (= 3·28090 ft. Eng.), they stand thus:

	Mètre.		Inches English.
English foot	= 0·30479	Paris foot	= 12·78912
Paris “	= 0·32484	Rhenish “	= 12·35652
Rhenish “	= 0·31385		

In round numbers, 46 French feet = 49 English feet, 34 Rhen. or Germ. feet = 35 English, and 57 French feet = 59 Rhen. The Russian F. is equal to the English. Almost every German state has or had a different foot. The Rhenish F. is that used in Prussia. The longest F. is the old Turin F. = 20 inches English. Many local feet are only about 10 inches. The foot has almost uniformly been divided into 12 inches; the inch into 12 lines, often into tenths. The French *pied usuel* is the third part of the *mètre*. See **YARD: METRE**.

FOOT, SOLOMON: 1802, Nov. 19—1866, Mar. 28; b. Cornwall, Vt.: lawyer. He graduated at Middlebury College 1826, became tutor in Vt. Univ. 1827, was prof. of nat. philos. in the Castleton Acad. of Medicine 1828–31, was admitted to the bar 1831, and settled in Rutland. In 1833, 36–38, 47 he was a member of the legislature and 1837–8, 47 speaker, 1843–47 was a member of congress, and from 1850 till death was U. S. senator. He was a whig in early life, became a republican 1854, served in both branches of congress as chairman of important committees, and was pres. pro tem. of the senate 1860–63, Mar. 4, part of the XXXVIth and all of XXXVIIth congress.

FOOTA-BONDON: see **BONDON**.

FOOT AND MOUTH DISEASE' in Cattle: see **CATTLE-PLAGUE: MURRAIN**.

FOOT-BALL: game in which a large light ball is kicked. F. may be played by any even number of persons divided into two sides. The ball used in England is a hollow india-rubber sphere covered with strong leather, but in the United States the regulation ball is oval in shape and also leather covered. A large level piece of ground or lawn is marked off with goal lines at each end, and the game is played in the intervening space, by each side of players endeavoring to kick the ball to the goal of their opponents and to keep it from their own goal. In

FOOT-BALL.

In England the goals are formed each of two upright posts. Under the Rugby rules each set of posts are joined by a cross-bar at a height of 10 ft., and under the F. Assoc. rules a tape at the height of 8 ft. takes the place of the bar. The movement in the Rugby game is to kick the ball between the posts and over the cross-bar to the opposite goal; in the assoc. game to kick the ball through the posts below the tape. In the United States the game is played both in conformity with the Rugby plan and rules, and under rules authorized and adopted by the American Inter-Collegiate Assoc. According to the latter, which are most generally observed, the ground must be 330 ft. long, 160 ft. wide, with a goal placed in the middle of each goal-line, composed of two upright posts, exceeding 20 ft. in height, placed $18\frac{1}{2}$ ft. apart, with cross-bar 10 ft. above ground. The game is played with teams of 11 men each, with substitute men to take the places of players disqualified or disabled. The time of a game is $1\frac{1}{2}$ hours, each side playing 45 minutes from each goal, with an intermission of 10 minutes between the two halves; and the game is decided by the score of even halves. The American Inter-Collegiate Assoc. prohibits backing, throttling, butting, tripping up, tacking below the knees, and striking with closed fists, which are tolerated under the Rugby rules. At best the game is accompanied by extreme roughness; but through the influence of college authorities the danger to life and limb has been greatly lessened. The values of the points in scoring are: goal obtained by touch-down 6; goal from field-kick 5, touch-down failing goal 5; safety by opponents 2. Captains toss up before the game and the winner has choice of goal of kick-off; the same side cannot kick off in two successive halves, the ball is kicked off at the beginning of each half, and whenever a goal has been obtained the side which has lost it shall kick off. Letting the ball fall from the hands and kicking it the instant it rises is a *drop-kick*; kicking it after it has been placed on the ground is a *pace-kick*; kicking it before it touches the ground is a *punt*; a place-kick from the centre of the field of play is a *kick-off* and cannot score a goal; and a place-kick by a player of the side which has touched the ball down in their own goal, or into whose touch-in-goal the ball has gone, is a *kick-out* and cannot score a goal. A *goal* may be obtained by kicking the ball in any way except a punt, from the field of play over the cross-bar of the opponent's goal; but without touching the ground, or dress, or person of any player, after the kick. A *touch-down* is when a player putting his hand upon the ball on the ground in touch or in goal, stops it so that it remains dead or nearly so; and a *tackle* is when the holder of the ball is held by one or more players of the opposite side. A *scrimmage* takes place when the holder of the ball, being in the field of play, puts it down on the ground in front of him, and all who have closed round on their respective sides endeavor to push their opponents back, and, by kicking the ball, to drive it in the direction of the opposite goal-line. The moment the ball is in touch or goal the

FOOTE.

scrimmage ceases. Except during a scrimmage a player may take up a ball whenever it is rolling or bounding, and if he runs with it till he gets behind his opponents' goal-line, and there touches it down, he makes a *run-in*. It is lawful to *run-in* anywhere across the goal-line, and if a player running with the ball be tackled and the ball fairly held, the player tackling shall cry '*Held*,' and the one tackled '*Down*,' while some player of his side shall put it down for a scrimmage. The ball is *dead* in the Rugby game when it lies on the ground motionless, and under the American rules, when the holder or the referee has cried *Down*: when a goal has been obtained; when it has gone in to touch, or touch-in-goal, except for punt-out; when a touch-down has been made; and when a fair catch has been heeled. When the ball is dead no play can be made, except to put in play. A ball goes into *touch* when it crosses the touch-line, or when the holder puts part of either foot across the touch-line. The touch-line is in *touch*, and the goal-line in *goal*. The American rules provide that no player shall lay his hands upon, or interfere with an opponent, unless he has the ball; that no one wearing projecting nails, iron-plates, or gutta-percha on his shoes shall be allowed to play in a match; that ordinary rubber shoes but not rubber tips shall be allowed; and that no greasy or sticky substance shall be permitted on the person of any player.

FOOTE, *fût*, ANDREW HULL: U. S. naval officer: 1806, Sep. 12—1863, June 36; b. New Haven; son of Samuel A. F., U. S. senator. He was appointed midshipman in the navy 1822, Dec. 4, served on Com. Porter's expedition against the W. India pirates; was commissioned lieut. 1830, appointed capt. of the *Perry* and engaged in suppressing slave-trade on the coast of Africa 1849-52, was promoted commander 1852, and assigned to command the *Plymouth* on the Chinese station 1856. He reached his post shortly before the opening of the Anglo-Chinese war, and while arranging to protect American property was fired on by the Barrier forts. On being refused an apology for the act he attacked the four forts with two vessels, breached one fort and captured the others by storm, losing only 40 of his 280 men, though the forts were manned by 5,000 men. He was promoted capt. 1861, and made flag officer and commander of the western flotilla. The organization and equipment of this fleet under his direction was one of the most difficult and remarkable feats of the civil war. In 1862, Feb. 7, he assaulted and captured Fort Henry on the Tennessee, and on the 14th bombarded Fort Donelson an hour and a half with great effect. The army under Gen. Grant occupied it on the following day. In Mar. and Apr. he cooperated with Gen. Pope in a number of attacks on Island No. 10, excepting Vicksburg the strongest Confederate possession on the Mississippi river, and on Apr. 7 received its surrender. In the midst of most important service and at the height of success, a wound received at Fort Donelson forced him to resign his command and return home. He was promoted rear-admiral and was voted

FOOTE—FOOT-POUND.

the thanks of congress 1862, June 16, was appointed chief of the bureau of equipment and recruiting June 22, and was ordered to relieve Rear Admiral Dupont of Charleston 1863, June 4. While on his way to that station he was suddenly taken sick and died in New York. His character was impressive for moral excellence.

FOOTE, MARY HALLOCK: artist and author: b. New York, 1847: wife of Arthur D. F. She received her art education in the Cooper Union School of Design for Women, and was employed first to draw on wood the illustrations of articles for *The Century*, *St. Nicholas*, and other pictorial publications. The delicacy of her work soon attracted wide attention and led to her engagement as illustrator of several books, including *Mabel Martin*, *The Hanging of the Crane*, and *The Skeleton in Armor*, and as one of the artists employed to illustrate *Longfellow's Poems*. Subsequently she began writing short stories of decided merit. She has published two novels of western life, *The Led Horse Claim* (1882), and *John Bodewin's Testimony* (1885).

FOOTE, SAMUEL: 1720-77: b. Truro, Cornwall, England; of a good family: actor and writer of comedy. He was educated at Worcester College, Oxford, and about 1740 entered the Temple; but after a career of 'pleasure,' in the course of which he managed to dissipate two fortunes which had been left him, he turned to the stage for support, and 1744 made an unsuccessful debut in the character of Othello. In 1747, he opened the Haymarket Theatre—where he was at once director, actor, and dramatic author—with a piece entitled *Diversions of the Morning*. In this and other pieces, he introduced well-known living characters, and, by his admirable powers of mimicry, succeeded in drawing large audiences, till the theatre was closed by order of the magistrates. After 1752, he continued to perform alternately in London and Dublin. In 1766, he broke his leg by a fall from his horse, and amputation was found necessary. He, however, recovered his health and spirits, and even turned the incident to account on the stage, composing parts expressly adapted to his own state. Many comic anecdotes of F. are given in Cooke's *Memoirs of Samuel Foote* (1805). His conversation must have been inimitably comical. Dr. Johnson, who above most men had a power of refusing to be pleased against his will, met F. for the first time at Fitzherbert's, and assumed his most ursine manner; but to no effect: 'I was obliged,' he says, 'to lay down my knife and fork, throw myself back in my chair, and fairly laugh it out. Sir, he was irresistible.' His plays, four of the best of which are *An Auction of Pictures*, *The Minor*, *The Liar*, and *The Mayor of Garratt*, have been frequently published, but never in complete form. See Forster's essay in the *Quart. Rev.*, 1854.

FOOT-POUND: the unit by which the *work done* by a force is estimated; thus (taking 1 lb. and 1 ft. as the units of weight and distance), if 1 lb. be raised through 1 ft., the *work done* is equal to 1 foot-pound; if 10 lbs. be raised 9 ft., the *work done* is 90 foot-pounds; and generally, if W. repre-

FOOT-ROT—FOOT-WASHING.

sent the *work done*, *P* the *weight in pounds*, and *h* the *height in ft.* then W (in foot-pounds) = Ph . See DYNAMICS: FORCE: WORK.

FOOT-ROT: inflammatory and ulcerous disease affecting the feet of sheep; closely allied to, but much more virulent than, Foul in the Foot (q. v.) which affects both sheep and cattle. F. R. is not common in this country but occasionally occurs and sometimes proves destructive. Owing to the different form and greater development of their hoofs, Merino sheep are much more difficult to treat for this disease than the English breeds. They are also more liable to be attacked. The cause of the disease is uncertain. Some hold that it is due to the collection of mud and filth between the hoofs, or to standing in wet places or on fermenting manure; others believe that it is not spontaneously generated but spreads only by contagion. The first indications of F. R. usually are redness of the skin, heat over the heels, just above the cleft of the foot, and an offensive odor. The sheep becomes lame, an ulcer forms and works its way between the flesh and the horny covering of the foot, soon followed by a discharge of fetid matter. If unchecked the disease makes rapid progress. The hoof, and soon the whole foot becomes disorganized and the animal perishes. The genuine F. R. is highly contagious. Upon its first appearance every animal showing a trace of the disease should be separated from the remainder of the flock and the quarters thoroughly disinfected. Treatment consists in carefully cleaning the feet, cutting away all the horn that covers the diseased places, and thoroughly applying to every portion of the affected parts some caustic remedy. If taken in the first stages, before ulcers are formed, cutting the hoof will not be required. A wash consisting of one part sulphuric acid and three parts of water, promptly and repeatedly applied with a feather after the surface has been thoroughly cleaned, may effect a cure. For severer cases caustic applications combined with antiseptics are indicated. A saturated solution of blue vitriol, kept hot while in use, has proved a remarkably efficient remedy in extreme cases. The treatment should be followed by disinfection of the premises.

FOOT'-WASHING, in Religious Ceremonial: an observance among certain sects, which finds its origin in a literal compliance with the instruction of Christ who, at the pass-over on the eve of the crucifixion, having washed the feet of his disciples said to them, 'I have given you an example that ye should do as I have done unto you.' As Christianity was extended in hot eastern countries and among sandal-wearing peoples accustomed to frequent bathing of the feet; there were constant occasions for following the outward form of this example as well as its inward spirit. Consequently, it became a part of hospitality among the primitive Christians to make provision for washing the feet. But gradually the act became a ceremony rather than a service; and was performed at appointed seasons, rather than in times of need. And in proportion as the

FOP—FORAGE.

spirit of kind condescension declined, the pomp of the ceremonial was increased. In Spain, about the 8th c., the observance was made part of Easter celebration; in the Greek church it was declared a sacrament, and in the Latin, was regarded as effective in procuring remission of sins. During the middle ages it had a place in the consecration of bishops and the crowning of kings. At the Reformation, Luther condemned the outward, literal ceremony as vain, but advocated in its place a habitual spirit of genuine humility and of practical kindness as occasion offered; the Anabaptists maintained the literal observance; and, since that time, several of the smaller sects have been strict in enforcing it (see TUNKERS). In the imperial chapels of Russia it is solemnly observed; at the courts of Lisbon, Madrid, Munich, and Vienna, and in many cathedrals and convents it is customary on a set occasion to wash the feet of 12 poor, old men, and at Rome, in the Clementine chapel, the old men chosen to represent the apostles are arrayed in woollen tunics, and the pope, dressed like them, slightly washes, wipes, and kisses one foot of each. At the entertainment which follows, the pope and cardinals serve the table and then dismiss their guests, giving them the dresses, towels, and a small sum of money. The Anglican church in its earlier days maintained the observance literally, but in modern times it gathers every year at Whitehall a company of poor persons equal in number to the years of the monarch's reign, each of whom receives raiment, food, and a sum of money made up of a number of pieces equalling the years of the monarch's age.

FOP, *n.* *föp* [Dut. *foppen*, to jeer, to banter: It. *fiappe*, a flap with a fox tail: Gael. *faop*, to protrude, to swell]: a man devoted to his dress and personal appearance; a vain conceited fellow; one over-nice and affected in dress, speech, and behavior; a swell; a dandy. FOP'PERY, *n.* *-për-î*, excessive fondness of dress; idle affectation. FOP'PISH, *a.* *-pîsh*, dressing in the extreme of fashion; vain; affected in manners. FOP'PISHLY, *ad.* *-lî*. FOP'PISHNESS, *n.* the state of being foppish.—SYN. of 'foppish': dandyish; dandified; spruce; finical; coxcombical.

FOR, *prep.* *för* [Goth. *faur*, or *faura*: Icel. *fyrir*, before: Ger. *für*, for: L. *pro*, before]: in the place of; towards; on account of; beneficial to; with respect or reference to; for the sake of, etc. As FOR, *prep.* phrase. FOR ALL THAT, notwithstanding. FOR ALL THE WORLD, wholly; exactly. FORASMUCH AS, seeing that; in consideration of: CONJ. a phrase by which a reason is introduced of something before advanced.

FOR, *för*, *prefix* [Ger. *ver*; Goth. *fra*, or *fair*; F. *for*, away: L. *foris*, without]: not; against; forth; away—as FORBID, to bid a thing away. FORGET, to away-get; to lose from memory. FORGO, to go without or against. FORFEND, to ward off.

FORAGE, *n.* *för'āj* [OF. *fourage*, forage, pillage: F. *fourrager*, to fodder: Ger. *futter*: Swiss, *fuhr*, victuals, food;

FORAGE—FORAMEN.

Gael. *feurach*, abounding in grass, grassy]: *literally*, a search for food by roving; food for horses and cattle, as grass, hay, or oats; provisions in general: V. to rove or range in quest of food; to collect food for cattle or horses; to supply with fodder; in *OE.*, to rove; to ravage. FOR'AGING, imp.: ADJ. collecting provision for horses and cattle; wandering in search of food: N. an incursion for forage or plunder. FOR'AGED, pp. -*ājēd*. FOR'AGER, n. -*ēr*, one who. FORAGING-CAP, an easy-fitting light cap, fit for soldiers on a foraging-party. FORAY, n. *för'ā*, a sudden incursion into a country in a hostile manner, as in border warfare.

FORAGE: hay, straw, and oats supplied to horses of officers and soldiers in the army. Where troops are together, the provision of forage devolves on the commissariat: officers of the staff, etc., who are entitled to horses, under certain circumstances receive a money allowance, instead of forage in kind, varying according to the place and the price of provender. Cavalry horses in the United States army are each allowed about 14 pounds of hay and 14 quarts of oats per day. In default of oats about 12 pounds of either barley or corn for each horse may be substituted. Corn fodder is not as desirable as hay, but is sometimes used when the latter cannot be obtained. Each mule is daily supplied with 14 pounds of hay, but is given only 9 pounds of grain.

FORAKER, *fūr'a-kēr*, JOSEPH BENSON: lawyer: b. near Rainsborough, Highland co., O., 1846, July 5. He enlisted in the 89th O. inf. when 16 years old, served through the civil war in the army of the Cumberland, was breveted capt. for services in the N. C. and Ga. campaigns, and when mustered out was aide-de-camp to Gen. Henry W. Slocum. He studied two years at Wesleyan Univ., Delaware, O., then entered Cornell Univ., where he graduated 1869, and having studied law was admitted to the bar the same year and began practicing in Cincinnati. In 1878 he was appointed chief supervisor of elections for the s. district of O., 1879 was elected judge of the superior court for five years, but resigned from ill health 1882; 1883 was defeated as republican candidate for gov., and 1885 was elected. He was elected to the United States Senate, 1897, and re-elected 1903.

FORALITES, n. plu. *för'ä-līts* [L. *förō*, I bore; Gr. *lithōs*, a stone]: in *geol.*, certain tube-like markings occurring in sandstones and other strata.

FORAMEN, n. *för-ā'mēn*, FORAMINA, n. plu. *för-ām'ī-nā* [L. *forāmen*; It. *forame*, an aperture—from L. *förō*, I bore]: a small opening. FORAMINATED, a. -*nā-tēd*, having little holes or perforations. FORAMINOUS, a. -*ī-nūs*, perforated in many places: porous. FORAMINIFERA, n. plu. -*nīf-ēr-ā*, or FORAMINIFERS, n. plu. *för-ām-īn'ī-ferz* [L. *fērō*, I bear]: in *zool.*, a class of Protozoa of very simple organization, but possessing complicated shells, often perforated for the passage of processes of the body-substance. FORAMINIFEROUS, a. -*ēr-ūs*, allied or relating to the foraminifera. FOR'AMINIFER, n. -*ī-fēr*, one of the foraminifera.

FORAMINIFERA.

FORAMINIFERA: group of most marine Protozoa (q.v.), consisting of a mass of homogeneous granular protoplasm, in which a nucleus has recently been shown to exist, and which fills and envelops a shell, sometimes chitinous or sandy, but most frequently calcareous, which may be one or many chambered, having one or many minute apertures (Lat. *foramina*, whence the name). Through these little apertures, long, delicate, granular and anastomosing protoplasmic processes are protruded for the prehension of food. Most of the species are minute, though one of more than two inches in diameter has been found in Borneo, and fossil forms approaching this size are well-known under the name of Nummulites (q.v.), from their resemblance to coins. The existing species are very numerous, and have been distributed into many genera. They



Foraminifera :

- 1, *Orbulina universa*; 2, *Lagena striata*; 3 *Textularia*; 4, *Operculina*; 5, *Faujasina*; 6, *Rosalina globularis*; 7, *Cassidulina*; 8, Part of two chambers of an *Orbiculina*; 9, Vertical Section of fossil Nummulite.

are found among sea-sand, and among all the dredgings of deep water. The fossil species are still more numerous, and constitute great part of some calcareous rocks, as of chalk. The F. are of very beautiful forms. Some of the simple ones are orbicular, some curiously flask-shaped; those in which the animal is divided into segments, and the shell consequently chambered, sometimes have the segments arranged in a straight line, sometimes spirally, sometimes alternately, etc. Linnæus and many naturalists ranked the F. with the genus *Nautilus*, and they were reckoned among the most highly organized mollusks, a place from which later discoveries have completely removed them. They may be regarded as modifications of the simple Rhizopod (q.v.) type, and may be thus classified:

FORASMUCH—FORBEARS.

A. IMPERFORATA.—One terminal aperture.

1. Shell one-chambered, chitinous, *Gromidæ*.
2. Shell many-chambered, porcellanous, *Miliolidæ*.
3. Shell arenaceous, *Lituolidæ*.

B. PERFORATA.—Many minute apertures. Vitreous.

1. One-chambered, *Lagenidæ*.
2. Many-chambered, *Globigerinidæ*.
3. Many-chambered, with internal canals, *Nummulitidæ*.

See Carpenter on *Foraminifera*; Huxley, *Anat. of Invert. Animals*.

Fossil Foraminifera. The earliest records of this order yet observed are in sandstones near St. Petersburg, belonging to the Lower Silurian measures. Scattered through these sandstones are numerous green grains, shown by Ehrenberg to contain, in their interior, silicious casts of shells similar to the recent genera *Guttulina* and *Textularia*. Forms, apparently referrible to the last genus and to *Fusulina*, constitute a large portion of some beds of carboniferous limestone in Russia, and in the United States. Among the Secondary rocks, and especially in the Chalk, F. are very abundant. Chalk, indeed, is composed almost entirely of the perfect or broken shells of *Rotalia*, *Spirulina*, *Textularia*, etc. (see CHALK). In the tertiary strata they are not more numerous, but attain enormous size—gigantic compared with any that preceded, or with recent forms. Vast beds of limestone occur on the borders of the Mediterranean, composed almost entirely of these large forms. See NUMMULITES: NUMMULITE LIMESTONE.

FORASMUCH, conj. *för'äs-müch'* [made up of *for*, *as*, and *much*, which see]: used with *as*, forasmuch as—and so equivalent to *by reason of the fact that*, or *in accordance with the fact that*.

FORAY: see under **FORAGE**.

FOR'BACH, *för'bách*: town of Alsace-Lorraine, Germany, 11 m. n.w. of Saargemünd, near the Prussian frontier, prior to 1870–1 cap. of Canton in the dept. of Moselle, France. It is in a rich coal region, the mines of Petite Rosselle, Urselsbach, Schönecke, and Stiring-Wendel yielding annually over 50,000 tons. Near the town are the heights of Spichern, where the German armies of Gen. Steinmetz and Prince Frederic Charles defeated the French under Gen. Frossard 1870, Aug. 6. After the battle the town was occupied by the Germans, and was included in the Alsace Lorraine territory annexed to Germany by the treaty of peace 1871. Pop. (1871) 5,428; (1890) 7,327.

FORBADE: pt. of **FORBID**, which see; did forbid.

FORBEAR, v. *för.bär'* [*for*, away, and *bear*]: to refrain from; to spare; to withhold; to stop or cease; to pause. **FORBEAR'ING**, imp.: **ADJ.** patient; long-suffering. **FORBORE'**, pt. *-bör'*, did forbear. **FORBORNE'**, pp. *-börn'*, withheld. **FORBEAR'INGLY**, ad. *-lī*. **FORBEAR'ANCE**, n. *-bär'äns*, lenity; restraint of temper; exercise of patience.—**SYN.** of 'forbearance': abstinence; mildness; long-suffering; refraining; indulgence.

FORBEARS: see **FOREBEARS**.

FORBES.

FORBES, *fawrbz*, **ARCHIBALD**: war correspondent; b. Morayshire, Scotland, 1838; son of the Rev. Lewis F., D.D., of the Presb. Church of Scotland. He was educated at home, by private tutors, and in Aberdeen Univ., served five years in the royal dragoons, and began his work in journalism in London 1865. At the outbreak of the Franco-German war 1870, he was engaged by the London *Morning Advertiser* as its field correspondent, with the privilege of choosing the side he desired to follow. From a knowledge of German tactics and language he concluded to accompany the Prussian armies, and subsequently witnessed the whole of that brief though bloody contest, sending to the *Advertiser*—often by much necessitated stratagem, long, personal, and descriptive letters instead of brief telegrams of results. Just before the siege of Paris he accepted an engagement with the London *Daily News*, which he held many years. He received the first intelligence of the intentions of the Commune, was the first to enter Metz, made a survey of Paris before the capitulation in the garb of a Prussian cavalryman, and entered the city with the conquering armies. In 1872 he was a spectator of much of the fighting in Spain, with the Republican, Carlist, and Alfonsist troops; 1874, visited India during the great famine; 1875, accompanied the Prince of Wales to India; 1876, took part in the military operations in Servia; 1877, joined the Russian army in the war against the Turks and was present at the crossing of the Danube, the capture of the Biela, the battle of Plevna (July 3), the engagements at Shipka Pass and the five days' assault on Plevna (Sep.): 1878 accompanied Sir Garnet Wolseley to Cyprus, and saw the beginning of the Afghan war; 1879-80, went through the war in Zululand: and 1880, Oct. made a lecturing tour in the United States. 1886, June 19, he was married in Washington, D. C., to Louisa, daughter of Quartermaster-Gen. M. C. Meigs. He published *William of Germany* (1888). D. 1900, March 29.

FORBES, *fawrbz*, **DUNCAN**, of Culloden: Scottish politician, Lord Pres. of the Court of Session: 1685, Nov. 10—1747, Dec. 10; b. in the neighborhood of Inverness. He studied law at Edinburgh, and at Leyden Univ.; was called to the bar, and soon appointed Sheriff of Midlothian. He rapidly gained practice and political influence through a personal and business connection with the Great Duke of Argyle. During both of the rebellions, F. was prominent on the side of the Hanoverian government. In 1715, he was in the north, with his elder brother John, actively opposing the rebels; but as on all occasions, F.'s partisanship was moderate. After the suppression of the rebellion, he was opposed to the project of carrying the prisoners out of Scotland to be tried by English juries, and to the forfeitures—and this on grounds of policy as well as of humanity; but the only effect of his moderation was to bring suspicion on his own loyalty. Nevertheless, a few years later various offices were conferred on him, and in 1725 he was lord advocate. F.'s family was distinguished for convivial habits in an age famous for deep potations;

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and in earlier life he followed the custom of the family: in later years he modified these habits.

F. greatly contributed to the prosperity of Scotland by fostering and developing her internal resources. His policy was to extinguish the rebellion by gaining over the Jacobites to the government. The purity and uprightness of F.'s character were subjected to a severe test, when his whole correspondence during these troubled times came to light abt. 70 years after his death but the exposure presented on point of infringement on the most delicate honor. F.'s views of political economy were not greatly in advance of his time; for in order to encourage the use of malt, he presented to the govt. a detailed scheme for preventing, or for punishing the use of tea. F. was appointed pres. of the court of session 1737. The rebellion of 1745 took him by surprise. Lovat, as is well known, betrayed both him and the government, and actually made an attack on Culloden House, from which he was beaten off with great spirit by the pres. and his people. When the rebellion spread, he was forced to abandon his house, and take refuge in the island of Skye, till after the battle of Culloden. On his return, he was regarded with aversion by the government. Even the large sums of money which he had advanced were never repaid him; and it is said that the ingratitude of the government, with the perfidy of many of his friends and neighbors, who had changed sides more than once during this miserable affair, weighed so heavily on his spirits as to shorten his life. The Parliament House in Edinburgh contains a portrait and a statute of the Lord President F., who was a man of great elegance of person and manner. The most complete biography is that of Mr. Burton in his *Lives of Simon Lord Lovat and Duncan Forbes*, 1848.

FORBES, EDWARD: 1815, Feb. 12—1854, Nov. 18; b. at Douglas, Isle of Man: naturalist. He received an imperfect education in consequence of ill health; yet at the age of 16, he had considerable knowledge of botany, zoology, and geology. In 1831, F. went to London to become a student at the Royal Acad.; but deeming himself to lack artistic talent he turned his attention to medicine, and entered the Univ. of Edinburgh. In 1836, he made his final choice to pursue the natural sciences. He attended lectures at Paris, where he studied under Geoffroy St. Hilaire, Jussieu, and De Blainville. His published observations made on his many rambles in his own land and abroad, attest his diligence as an observer, and his exact appreciation of analogies and differences of forms. F. may almost be regarded as the originator of the use of the dredge, which he employed in the Mediterranean and the *Ægean*, as well as in British seas. In 1841, he joined the surveying ship *Beacon*, as naturalist, surveying a part of Asia Minor. Returning 1843, he found that he had been elected to the chair of botany, King's College, London. He was soon afterward named curator of the Geological Soc.; and till his removal to Edinburgh he lived in a vortex of scientific labors and literary work. In 1851 he was named prof. of natural history in the School of Mines; in 1852, was chosen pres. of the Geologi-

cal Soc., an honor never before conferred on so young a man; and in 1853, was elected to the vacant chair of natural history in the Univ. of Edinburgh. But at the commencement of the winter session he was seized with a severe illness, which speedily proved fatal, in the very zenith of his fame.—F. did much to advance and systematize special departments of natural history. His classification of the British *Star-fishes* opened a new era in that branch of zoology; and his discovery that air-breathing mollusks lived at the period of the Purbeck beds, has been the means of rectifying many erroneous hypotheses, and throwing unexpected light on several obscure points of geology. His observations on the distribution of animal and vegetable life in different zones of the sea and land, have opened many new fields of research. Many of his best papers were written for the meetings of the British Assoc. and other societies. Among his separate works, papers, and monographs, of which more than 200 are published, many copiously illustrated by his own beautiful drawings, are: *On the Distrib. of Pulmonif. Mollusca in Europe* (1838); *Malacol. Monensis* (1838); *Star Fishes* (1841); *The Radiata and Mollusca of the Ægean* (1843); *Travels in Lycia* (written in conjunction with Lieut. Spratt, 1846); *Naked-eyed Medusæ* (1847); *British Mollusca* (1853, 4 vols. 8vo, conjointly with S. Hanley); *Map of Homiozoic Belts* (Johnston's *Phys. Atlas*, 1854); *Collection of Literary Papers by E. Forbes* (1855); etc. See *Memoir* by G. Wilson and A. Geikie, 1861.

FORBES, JAMES DAVID, D.C.L.: principal of the United College in the Univ. of St. Andrews: 1809, Apr. 20—1868, Dec. 31; b. Colinton, near Edinburgh; grandson of Sir William F., of Pitsligo. He studied in the Univ. of Edinburgh 1825–30, and was admitted to the Scottish bar; and was appointed, 1833, to the chair of nat. philosophy in the Univ. of Edinburgh. He was a member of numerous scientific societies, received the Royal and the Rumford medals from the Royal Soc. of London, and two Keith medals from the Royal Soc. of Edinburgh. In 1860, F. became principal of the United College in the Univ. of St. Andrews. Among his contributions to science are—the polarization of radiant heat by the tourmaline, and also by reflection (1836), and its circular polarization—discoveries forming some of the strongest proofs of the identity of calorific and luminous rays; the unequal polarisation of heat from different sources (1844); the refrangibility of heat; the depolarization of heat; etc. This whole series of experimental results is of very high importance. His researches on the motion of glaciers—in *Travels in the Alps* (1843); *Norway and its Glaciers* (1853); *Tour of Mont Blanc and Monte Rosa* (1855); and *Occasional Papers on the Theory of Glaciers* (1859)—made him popularly known as undoubtedly the first to establish the great fact, that glacier ice moves in its channel like a viscous fluid, the middle moving faster than the sides, and the upper portions faster than the lower: see GLACIERS. In meteorology, F. made advances in both theory and experiment. His *Life and Letters*, edited by Principal Shairp of St. Andrews. Prof. Tait

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of Edinburgh, and Mr. Adams Reilly, the Alpine traveller, was published in London 1873.

FORBES, JOHN: 1710–1759, Mar, 11; b. Petincrief, Scotland: soldier. He studied and practiced medicine a short time, was appointed lieut.col. in the Scotch Grays 1745, was a staff officer in the German war, became col. of the 17th foot and quartermaster-gen. under the Duke of Cumberland, 1757, was appointed a brig.gen. in America 1757, Dec. 28, captured Fort Du Quesne, Penn, 1758 Nov. 25, and named the place Pittsburg in honor of the English prime minister, concluded treaties with the Indians on the O. river, and died in Philadelphia.

FORBES, Sir JOHN, D.C.L.: 1787, Oct. 18–1861, Nov. 18; b. at Cuttlebrae, Banffshire: Scotch physician. After studying at Aberdeen and Edinburgh, he entered the navy 1807 as assistant-surgeon, and continued till 1816. In 1817, he took the degree M.D. at Edinburgh and afterward practiced at Penzance and Chichester. In 1840 F. went to London, where he speedily obtained a large practice. He was knighted 1853 by the queen, to whose household he held the appointment of physician in ordinary, while he was physician extraordinary to Prince Albert. He was a fellow of the College of Physicians, and the Royal Soc. of London; and a member of numerous foreign societies. F., with Drs. Tweedle and Conolly, edited the *Cyclopædia of Practical Medicine* (completed in 4 vols. 8vo. 1839); and founded, and conducted for 12 years, the *British and Foreign Medical Review*. To F. in great measure belongs the merit of introducing the use of the stethoscope in England, and of commending to British practitioners the art of physical diagnosis. In 1831, he published the first ed. of his translation of Laënnec's *Treatise on Auscultation*; and in 1838, when the fifth ed. appeared, the new method was already extensively used. He wrote also *Physician's Holiday* (1849), and *Sight-seeing in Germany and the Tyrol* (1856). His last professional work, *Nature and Art in the Cure of Diseases* (1857), contains a systematic exposition of his medical doctrines.

FORBES, JOHN MURRAY, S.T.D.: 1807, May 5–1885: dean Gen. Theol. Seminary of the Prot. Episc. Church. He graduated at Columbia College 1827 and the Gen. Theol. Seminary 1830; was asst.prof. of ancient languages in Trinity College, Hartford, a short time prior to receiving orders in the Prot. Episc. Church; became rector of St. Luke's Church, New York, 1834, and held the office of prof. of pastoral theol. and pulpit eloquence in the Gen. Theol. Seminary, and was a delegate from the diocese of New York to the Gen. Conventions of the church 1844–47. In 1847 the Gorham Controversy arose in England and caused a number of Anglican ministers to enter the Rom. Cath. Church. In 1849 F. took this course, not, as has been asserted, in company with the Rev. Drs. Newman and Manning, because the former made the change in 1845, after leading in the Oxford Movement, and the latter in 1851 in consequence of the Gorham case. F. be-

came pastor of St. Ann's Rom. Cath. Church, New York, theologian of the Rom. Cath. bp. of S. C. in the Baltimore plenary council 1852, and of the bp. of Boston in that of New York 1854. He returned to the Prot. Episc. Church 1859; was restored to ministerial functions 1862, and was dean of the Gen. Theol. Seminary 1869-72. He received the degree D.D. from Columbia College, and S.T.D. from Pope Pius IX.

FORBES, Sir WILLIAM, of Pitsligo, Bart: banker: 1739. Apr. 5—1806, Nov. 12; b. Edinburgh; son of Sir William F., Bart., advocate. Educated at Aberdeen, in his 15th year, he was introduced into the bank at Edinburgh of Messrs. John Coutts & Co.; and in 1761, was admitted a partner. In 1763, a new company was formed, and, 1773, the name was changed to Sir W. Forbes, J. Hunter & Co., and of this firm Sir William was the head till his death. On his estate at Pitsligo, he introduced extensive improvements, and laid out and built the village of New Pitsligo. He was a member, with Johnson, Burke, Garrick, Reynolds, and others of the celebrated Literary Club of London, and author of a Life of his friend, Dr. Beattie, the poet. His bank became, 1830, the Union Bank of Scotland.

FORBES MACKENZIE ACT: English parliamentary statute, 1853, introduced by Forbes Mackenzie, M.P. for Peeblesshire entitled 'An act for the better Regulation of Public-houses in Scotland. This act retained in general the provisions of previous statutes, but it prohibited the granting of certificates for excisable liquors to be 'drunk on the premises,' unless on the express condition that no groceries or other provisions to be consumed elsewhere should be sold in the house or premises with respect to which such certificate is granted. The object of this portion of the enactment was to prevent grocers from becoming in reality keepers of tippling houses. In accordance with the principle of distinguishing between the different classes of houses in which the trade of a spirit-dealer should be carried on, three different grades of licenses were introduced; applicable, 1, to inn or hotel keepers; 2, to public-house keepers (known in America as saloon-keepers); 3, to grocers and provision-dealers. As regards innkeepers, it is enacted that they shall not 'keep open house, or permit or suffer any drinking in any part of the premises belonging thereto, or sell or give out therefrom any liquors, before eight o'clock in the morning, or after eleven o'clock at night of any day, with the exception of refreshments to travellers, or persons requiring to lodge in the said house or premises; and further, that they shall not open their houses for the sale of any liquors, or sell or give out the same on Sunday, except for the accommodation of lodgers and *bonâ-fide* travellers.' The same restrictions are imposed on the second class of persons—keepers of public-houses, with this addition, that no exception is made in their case in favor of travellers or lodgers; while grocers and provision-dealers, in addition to the prohibition to open on Sundays, and that already mentioned with reference to

FORBIL—FORBIDDEN FRUIT.

the consumption of spirits on the premises, are forbidden 'to sell or give out any liquors before six o'clock in the morning, or after eleven o'clock at night.' Separate licenses were introduced for the sale of malt liquors from those applicable to the sale of wine and spirits, all of which had formerly been included under one license. By this statute also, for the first time in Scotland, the very formidable power was conferred on the police of entering at any time any public house, or house where refreshments are sold to be consumed on the premises, and penalties were awarded against those who refused to admit them, or who obstructed their entrance. These provisions having given rise to much discussion, a Royal Commission to inquire into the working of the act was issued 1859, Apr. 25, resulting in two enormous volumes of printed evidence, and of a report, distinguished for its length more than for its value. The commissioners arrived at the conclusion that intemperance had decreased, in consequence chiefly of the increase of the duty on excisable liquors from 2s. 4½d. per imperial gallon (in 1823) to 8s. (in 1855). They give to the Forbes Mackenzie act a share of the credit; and while generally approving it, they suggest a number of alterations, mostly with the view of enabling the police to carry out its provisions with greater efficiency. In reference to the difficulty experienced by hotel-keepers in ascertaining what persons come under the description of *bonâ-fide* travellers, the commissioners recommended a law for punishment of persons obtaining excisable liquor on false representations on Sunday, or before opening or after closing hours: such a law was passed 1862. It has been decided in England that to constitute a 'traveller' within the meaning of the corresponding Act it is a matter of indifference whether the parties be travelling for business or pleasure, and that a walk, ride, or drive, for exercise and amusement of such length as to render refreshments desirable, is a sufficient journey. In *Atkinson v. Sellers* (5 C. B. N. S. 442), Chief Justice Cockburn remarked, that 'a man could not be said to be a traveller who goes to a place merely for the purpose of taking refreshment. But if he goes to an inn for refreshment in the course of a journey, whether of business or of pleasure, he is entitled to demand refreshment, and the innkeeper is justified in supplying it.' See also *Taylor v. Humphreys*, C.P. 705; 4 L. T. N. S. 314. The first was in the case of a drive from Liverpool of 5½ miles, the second of a walk from Birmingham of 4 miles.

FORBID, v. *för-bid'* [*for*, and *bid*: AS. *forbeodan*]: to prohibit; to command not to do; to obstruct. FORBID'DING, imp. prohibiting; hindering: ADJ. repelling approach; disagreeable; offensive: N. hindrance; opposition. FORBADE', pt. *-bād'*, did forbid. FORBID'DEN, pp. *-bid'n*: ADJ. prohibited; hindered. FORBID'DENLY, ad. *-li*. FORBID'DER, n. one who.—SYN. of 'forbid': to interdict; hinder; command; oppose; debar; exclude;—of 'forbidding, a.': unpleasant; displeasing; abhorrent; odious; repulsive; repellent.

FORBID'DEN FRUIT: fanciful name, scarcely used in

FORBORE.

the United States, for the fruit of different species of *Citrus*. In the shops of Britain, it is a small variety of the Shaddock (q. v) which generally receives this name. But on the continent of Europe, a different fruit, regarded by some as a variety of the orange, and by some as a distinct species (*Citrus Paradisi*) is known as the F. F., or Adam's Apple. Like some other fruits of the same genus, it was recently introduced into the south of Europe from China. The tree has broad, tapering, and pointed leaves, the leaf-stalks winged; the fruit is large, somewhat pear-shaped, greenish-yellow, of very uneven surface, having around its base a circle of deeper depressions, not unlike the marks of teeth, to which it probably owes its name. It is chiefly the rind which is the edible part; the rind is very thick, tender, melting, and pleasant, there is very little pulp; the pulp is acid.—The name F. F. has been given also to the fruit of *Tabernæmontana dichotoma*, a tree of Ceylon, of the nat. ord. *Apocynaceæ*. The shape of the fruit which is a follicle, containing pulp—suggests the idea of a piece having been bitten off, and the legend runs that it was good before Eve ate of it, though it has been poisonous ever since.

FORBORE and **FORBORNE**: see under **FORBEAR**.

FORCE.

FORCE, n. *fōrs* [F. *force*, strength, force: It. *forza*—from mid. L. *forcūā*, or *fortūā*, force—from L. *fortis*, strong]: active power; vigor; quantity of power produced by motion; violence; troops; a body of land or naval combatants; capacity of exercising an influence or producing an effect; power to persuade or convince; validness; power of law: V. to compel; to obtain by force; to coerce; to draw or push by main strength; to ravish; to storm; to hasten growth by artificial heat or other means; in *OE.*, to strengthen with soldiers; to endeavor. **FOR'CING**, imp.: **ADJ.** impelling; driving; ravishing: **N.** the act of one who forces; the act of urging on the growth of plants and fruits to maturity; the raising of plants by artificial heat (see below). **FORCED**, pp. *fōrst*: **ADJ.** affected; overstrained; compulsory. **FORCE'FUL**, a. *-fúl*, driven with force; acting with power. **FORCE'FULLY**, ad. *-lī*. **FORCE'LESS**, a. having little or no force. **FOR'CER**, n. one who; the solid piston of a forcing-pump. **FORCIBLE**, a. *fōr'sī-bl*, having force or efficacy; active; powerful; weighty. **FOR'CIBLY**, ad. *blī*. **FOR'CIBLENESS**, n. *-bl-nēs*. **FORCING-PIT**, a covered frame sunk in the earth for accelerating the growth of plants. **FORCING-PUMP**, a pump for driving water onward, or throwing it to a distance. **IN FORCE**, or **OF FORCE**, valid; of full virtue; not suspended or reversed. **OF NO FORCE**, not valid; of no account. **FORCIBLE ENTRY**, taking or holding possession of real property through force or threat and without legal authority: it must be with such acts of violence or menace as imply some personal danger if resistance be offered—thus a violence beyond that of mere trespass. A plea of ownership will not excuse the owner for entering on his property in other than a peaceable manner. Nor is it accepted as excuse that the entry was to enforce a lawful claim, or that the entry forcibly attempted was gained finally by entreaty. *Note.*—In *physics*, **FORCE** may be applied to any pulling, pressure, tension, friction, or repulsion, whether applied by a stick or string, a chain or girder, or by means of an invisible medium. **FORCE** may be defined to be 'that which produces or changes the state of rest or motion in a body, and is often confounded with *energy*.'—**SYN.** of 'force, n.': energy; activity; power; strength; might; stress; compulsion; constraint; vehemence; coercion; pertinency; validity; armament; troops; — of 'force, v.': to drive; coerce; compel; constrain; necessitate; oblige; impel; press; violate; wrest; extort: enforce; urge; stuff;—of 'forcible': cogent; impressive; efficacious; potent; mighty; strong; violent; impetuous; powerful; energetic.

FORCE, v. *fōrs* [F. *farcir*; L. *farcīrē*, to stuff: *OE.* *fors*, spice or seasoning]: in *OE.*, to stuff. **FOR'CING**, imp. **FORCED**, pp. *fōrst*, stuffed. **FORCE-MEAT**, *fōrs'mēt*, meat chopped fine, and highly seasoned for stuffing; in *OE.*, spiced, highly seasoned meat.

FORCE, n. *fōrs* [*OE.* *foss*, a waterfall—from Icel. *foss*, formerly *fors*, a waterfall: Sw. *frussa*, to gush: W. *ffrwd*, a torrent]: in *prov. Eng.*, a cascade; a waterfall; also spelled **FORSE**.

FORCE, in *Physics*: often used to denote the same as **EN-**

ERGY, the power of doing work; though the two terms are not strictly synonymous—Force being, generally, that which tends to produce change in the state (whether rest or motion) of a body. Till we know what Matter (q.v.) is, *if there be* matter at all, in the ordinary sense of the word, we cannot hope to have any idea of the absolute nature of force. Any speculations on the subject only lead into a train of hypotheses entirely metaphysical, because utterly beyond the present powers of experimental science. If we content ourselves with a definition of F. based on experience, such a definition will say nothing of its nature, but will confine itself to the effects which are said to be due to F., and in the present state of our knowledge it is almost preposterous, in a scientific statement, to aim at more.

Our first ideas of F. are evidently derived from the exertion required to roll, or lift, bend, or compress, etc., some mass of matter; and it is easy to see that in all such cases where muscular contraction is employed, matter is moved, or tends to move. Force, then, we may say generally, is *any cause which produces, or tends to produce, a change in a body's state of rest or motion*: see MOTION, LAWS OF: (for one line of theory on this subject, see SUBSTANTIALISM). The amount or magnitude of a F. may be measured in one of two ways: 1. By the pressure it can produce, or the weight it can support; 2. By the amount of motion it can produce in a given time. These are called respectively the Statical and Dynamical measures of force. The latter is, as it stands, somewhat ambiguous. What shall we take as the quantity of motion produced? Does it depend merely on the velocity produced? or does it take account of the amount of matter to which that velocity is given? Again, is it proportional to the velocity itself, or to its square? This last question was very fiercely discussed between Leibnitz, Huyghens, Euler, Maclaurin, the Bernouillis, etc.; Leibnitz, being, as usual with him in physical questions, on the wrong side. Newton, to whom we owe the third law of motion, had long before given the true measure of a F. in terms of the motion produced. This law is an experimental result—that when pressure produces motion, the *momentum* produced (see MOMENTUM) is proportional to the pressure, and can be made (numerically) equal to it by employing proper units. Hence momentum is the true dynamical measure of F. which, therefore, is proportional to the *first* power only of the velocity produced. What is properly measured in terms of the *square* of the velocity, we shall presently see. For various properties of F., statical and dynamical, see COMPOSITION OF FORCES: COUPLES: CENTRE OF GRAVITY: CENTRAL FORCES: FALLING BODIES: MECHANICAL POWERS: VIRTUAL VELOCITIES.

It is obvious that in order to produce any effect at all, or to do WORK, as it is technically called (see WORK), a F. must produce *motion*, i.e., must move its point of application. A weight laid on a table produces no actual result in *work* unless the table yields to the pressure, i.e., unless the weight descends, be it ever so little. We do no work, however, much we may fatigue ourselves, if we try to lift

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a ton from the floor; if it be a hundred weight only, we may lift it several inches, and then we shall have done work—and it is evident that the latter may be measured as so many pounds raised so many feet—introducing a new unit, the FOOT-POUND, of great importance, as we shall shortly see, in modern physics: see WORK. This is evidently, however, a statical measure of work, since no account is taken of velocity. Have we then for work, as we had for F., a *dynamical* measure? Let us take a simple case, where the mathematical investigation is comparatively very easy, and we shall find that we have. We know (see VELOCITY: MOTION: LAWS OF) that if a particle be moving along a line (straight or not), and the distance moved (in the time t) along the line from the point where its motion commenced be called s , its velocity is $v = \frac{ds}{dt}$.

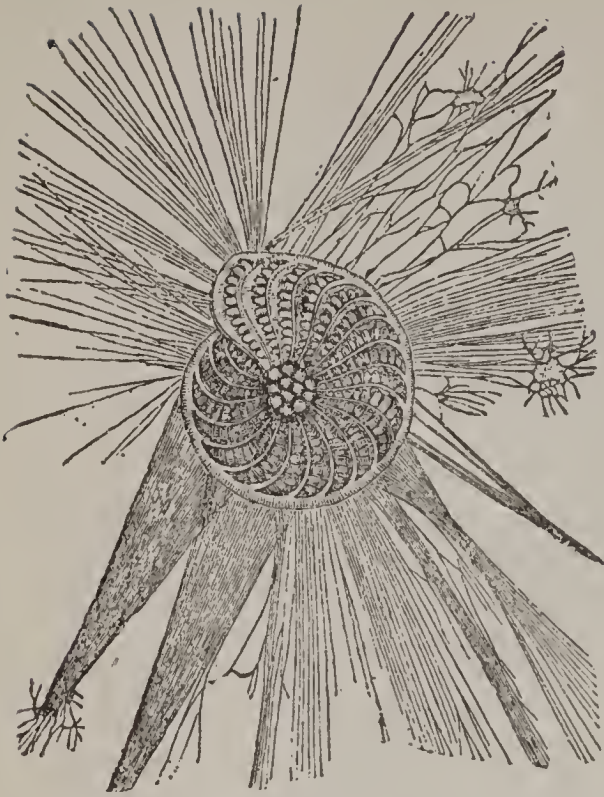
Also we know that the F. acting on it (in the direction of its motion) is to be measured by the increase of momentum in a given time—this gives (as the last equation was obtained) $F = m \frac{dv}{dt}$. From these two equations, we have, immediately, $mv dv = F ds$, or, as the rudiments of the differential calculus give at once, $\frac{mv^2}{2} = \int F ds = F.s$ if the F. be uniform.

The quantity on the right-hand side is the sum of the products of each value of F. by the corresponding space ds , through which the particle moved under its action. It is therefore the whole work done by the force. On the left hand, we find half the product of the mass, and the square of the velocity it has acquired; in other words, the vis-viva. Hence, in this case, the vis-viva acquired equals the amount of Work (q.v.) expended by the force.

It appears from a general demonstration (founded on the experimental laws of motion, and therefore true, if they are), that if, in any system of bodies, each be made up of particles or atoms, and if the forces that these mutually exert be in the line joining each two, and depend merely on the distance between them, then we can express the required proposition in the following form:

Any change of vis-viva in the system corresponds to an equal amount of work gained or lost by the attractions of the particles on each other.

What is spent, then, in work, is stored up in vis-viva; and conversely, the system, by losing some of its vis-viva, will recover so much work-producing power. If we call the vis-viva, as is now generally done, *Kinetic Energy*, and the work-producing power *Potential Energy*, we may express the above by saying, that in any system of bodies where the before-mentioned restrictions are complied with, *the sum of the kinetic and potential energies cannot be altered by the mutual action of the bodies*. The most simple and evident illustrations of this proposition are found in the case of the force known as gravitation. The potential energy of a mass on the earth's surface is zero, because no

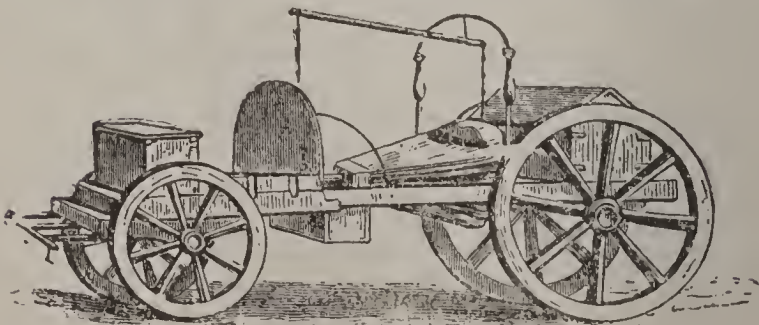


Forget-me-not (*Myosotis
palustris*).

A living Foraminifer (*Polystomella stri-
gillata*).



Foreshortened.—Banks's *Falling Giant*.



Artillery Travelling Forge.

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being able to descend, it has, in common language, no work-producing power. If it be raised above the surface, and then dropped, it is easy to see that the work expended in raising it will be exactly recovered as vis-viva after its fall. For (see FALLING BODIES) a mass falling through a space, h , to the earth acquires a velocity v , such that $v^2 = 2gh$, or if m be the mass, $\frac{mv^2}{2} = mgh$. The left-hand side

gives the vis-viva acquired by the fall—the right is the product of the weight (mg) and the height fallen through—or is the work required to elevate the mass to its original altitude.

Hence we may calculate the amount of work which can be obtained from a *head* of water in driving water-wheels, etc., remembering, however, that there is always a *loss* (as it is usually called) due to friction, etc., in the machinery. That there is a loss in useful power, is true, but we shall find presently that in energy there is none, as indeed our general result has already shown. *Where* the apparently lost energy goes, is another question. Another good example of potential energy is that of the weights in an ordinary clock. It is the gradual conversion of potential into kinetic energy in the driving weight which maintains the motion of the clock, in spite of friction, resistance of the air, etc.; and we have in the kinetic energy of sound (which depends on vibrations in the air) a considerable portion of the expended potential energy of the striking weight. A coiled watch-spring, a drawn bow, the charged receiver of an air-gun, are good examples of stores of potential energy, which can be directly used for mechanical purposes.

The chemical arrangement of the different components of gunpowder, or gun-cotton, is such as corresponds to enormous potential energy, which a single spark converts into the equivalent active amount. But here, *heat* has a considerable share in the effects produced; it may then be as well, before proceeding further, to consider how we can take account of it, and other (so-called) physical forces as forms of energy.

Correlation of Physical Forces.—So far as we yet know, the physical forces may be thus classified: I. GRAVITATION (q.v.); II. MOLECULAR FORCES—COHESION (including CAPILLARITY), ELASTICITY, CHEMICAL AFFINITY; III. HEAT AND LIGHT; IV. ELECTRICITY (including MAGNETISM); V. ANIMAL FORCE; VI. VITAL FORCE, having, as some irrationally suppose, an analogue in inorganic masses, which may be called Crystalline Force. (This notion is examined further on). Of these, I., II., and some forms of III., are more immediately connected with *matter* than the others—that is to say, that the remainder almost necessitate the hypothesis of the existence of some medium unlike ordinary matter, or, in popular language, an *imponderable*. The almost universal opinion of physicists, however, seems to be, that even the former must be accounted for in some such way. Newton, in his second letter to Bentley, says, with respect to gravitation (and it is obvious

that similar language is applicable to molecular forces generally): 'You sometimes speak of gravity as essential and inherent to matter. Pray, do not ascribe that notion to me, for the cause of gravity is what I do not pretend to know.' And again in the third letter: 'It is inconceivable that inanimate brute matter should, without the mediation of something else, which is not material, operate on, and affect other matter without mutual contact, as it must do, if gravitation, in the sense of Epicurus, be essential and inherent in it; and this is one reason why I desired you would not ascribe innate gravity to me. That gravity should be innate, inherent, and essential to matter, so that one body may act upon another at a distance through a *vacuum*, without the mediation of anything else, by, and through which their action and force may be conveyed from one to another, is to me so great an absurdity, that I believe no man who has in philosophical matters a competent faculty of thinking, can ever fall into it. Gravity must be caused by an agent acting constantly according to certain laws; but whether this agent be material or immaterial, I have left to the consideration of my readers.' Of what that medium may consist, we cannot, of course hazard even a conjecture; but if it be composed of separate atoms—i.e., not continuous—it is evident that a second medium will be required to help the particles of the first to act on each other (for without this, the first medium would be merely obstructive), and so on. This must stop somewhere; why not, then, at the first? But in the present state of our knowledge of mechanics, a continuous medium is barely conceivable, and its motions, etc., present considerable difficulties to even plausible mathematical treatment. If we take the view opposed to Newton's, as Mosotti and others have done (their ideas are considered further on) we can, in a very artificial manner, however, account for gravitation and molecular action; but, as before said, the foundations of this attempt at explanation are hardly tenable.

Just as sound depends on the elasticity of the air and vibrations thereby maintained and propagated, light and radiant heat, which are certainly identical, most probably consist in the vibrations of some very elastic fluid. This has been provisionally named Ether (q.v.). If it be continuous, it may help us to account for the first two categories of force also, as we have already seen; if not so (which is more likely) fresh difficulties arise. Light and heat, however, undoubtedly depend on motion, and correspond, therefore, to so much vis-viva or actual energy. Even heat in a liquid or solid body must correspond to some vis-viva in the material particles, since a hot body can give out both light and heat, and a body may be heated by luminous or calorific rays which are vibratory, as we have seen.

Class IV. contains perhaps the most puzzling of all these forces. That there is something in common in all the forms of electricity, and that magnetism is nearly related to them, is certain; it is probable, also, that frictional elec-

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tricity, when statical, consists in something analogous to a coiled spring, or is a form of potential energy—the others being forms of kinetic energy. Some have supposed magnetism to be also a form of potential energy but Ampère's discoveries have materially lessened the probability of the truth of this hypothesis. We shall consider this again.

Class V. may be deferred for the present.

As to Class VI., it seems, from the observations of physiologists as to the formation of cellular matter, and the production in living organisms of compounds which have not yet been made by ordinary chemical processes, that the vital F. if there be such, is not a F. which does work, in the mechanical sense of the term, but merely *directs*, as it were, the other natural forces *how to apply* their energies. Were a railway train running on a smooth horizontal line of rails, it would retain for ever its original velocity; but in turning a curve, it would be acted on by deflecting forces, without which its path would be straight. These forces *do no work*, as is evident, since this would be shown in alteration of the vis-viva, and none takes place. They modify, however, the direction in which the train moves.

When gangs of laborers and masons are at work building an edifice, the former are employed raising stones, mortar, etc., the latter in laying them; but there is present an overseer with a plan, who, doing no (mechanical) work himself, guides and directs the proper application of F. by the working body. In this view of the case, the laborers are the physical forces, and the overseer the vital force. It is certain that the so called crystalline F. cannot properly be put in this category, as presenting even an analogy, however slight; it is probably an effect, not a cause, and due to the different forms of simple or compound particles of matter, and the consequent variations in their molecular forces in different directions.

So far, then, for the possible nature of the forces, which, with the probable exception of VI., certainly depend on various forms of energy. Can these be transformed one into another, as the different kinds of mechanical energy can?—Take the potential energy of gravitation to begin with. We can employ it to drive a water-wheel. This turns a shaft, to which, if a tight brake be applied, heat will be produced by friction, and light also, if a rough wheel on the shaft be made to rotate against a piece of flint or pyrites; or electricity may be produced by employing the moving power to turn an ordinary electrical machine, or a magneto-electric one; and from the electricity so produced, electrical charges and currents may be derived; from them heat and light again. Or the currents may be employed to magnetize a needle or a piece of soft iron, or to produce chemical decomposition.—Heat may be employed by means of a steam-engine as a substitute for the water-power or potential energy of gravitation, and the above effects be produced. It may be employed also in raising weights, and therefore in producing the potential energy in question; or it may be employed to produce Thermo-electric Cur-

ments, and thence all the ordinary effects of electricity, including the motion of a magnetic needle.—Light may be employed to produce chemical combination or decomposition, as in photography, it may by the same means be made to produce electric currents, and consequent *motion* of a needle. It is not yet proved that light can produce magnetism *directly*, though there can be little doubt that, if properly applied, it is capable of doing so.—Chemical action in a voltaic battery can be made to produce motion, heat, light, electricity, electrical charges and magnetism, and to overcome other chemical affinity.—Capillary action has been employed to produce electricity, and mechanical effects, etc., but we need not go through the whole category.

In these experimental results, then, consists what is called the Correlation of the Physical Forces—i.e., the transmutability of one of the latter into another or others. The idea is old, but the proofs of its truth have become numerous only within the last half-century. See Grove's excellent treatise for further detail on this interesting subject.

Conservation of Energy.—But a far more important principle, being, in fact, the *precise* statement of the preceding—which is somewhat vague—is that of the Conservation of Energy. It is simply the extension (to all physics) of the principle given in full, and proved in a particular case, at the beginning of this article—i.e., that the sum of the potential and kinetic energies of any set of moving bodies cannot be altered by their mutual action. Let us now suppose heat, light, etc., to consist in the energy of vibratory movements of particles, and in their relative states of distortion, etc., and make the supposition that these particles act on each other—no matter by what means—in the line joining each two, and with forces which depend on their distance, and we have at once the theorem, that the sum of the potential and kinetic energies is a quantity unalterable in any system, save by external influences. Hence, when mechanical power is said to be lost, as it is by the unavoidable friction in machinery, etc., it is really only changed to a new form of energy—in general, heat. Thus, when a savage lights his fire, he expends animal energy in rubbing two pieces of dry wood together. If these pieces of wood were not in contact, no force would be required to move them past each other—more and more is required as they are more strongly pressed together. The equivalent of the energy so expended is found in the heat produced. Davy showed that two pieces of ice might be melted by rubbing them together. A skilful smith can heat a mass of iron to redness by mere hammering. Here the energy actually employed is partly given out in the shape of heat, and partly stored up in the iron as potential energy due to the compression of the mass, or the forcible approximation of its particles. Among the earliest, and certainly the *best* experiments on this subject, are those of Joule (q.v.). He determined the relation between the units of heat and potential energy of gravitation, by various methods, which gave very nearly coincident results. One of these was as follows.

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A paddle-wheel is so fixed as to revolve in a closed vessel full of water. The wheel is driven by the descent of a known weight through a measured space, and precautions are taken against losses of energy of all kinds. The water agitated by the paddlewheel comes soon to rest, as we know; but this is due to friction between its particles: and the final result is the heating of the water. The quantity of water, and also the number of degrees by which its temperature is raised, being measured, a simple proportion enables us to find how many foot-pounds (see FOOT-POUND) of mechanical energy correspond to the raising by one degree the temperature of a pound of water. The result is, that the heating a pound of water one degree Fahrenheit is effected by 772 foot-pounds—and this number is called *Joule's Equivalent*. In other words, if a pound of water fall to the ground through 772 ft. and be then suddenly arrested, its temperature will be raised one degree; and, conversely, the heat that would raise the temperature of a pound of water one degree, would, if applied by a steam-engine or otherwise, raise 772 pounds one ft. high. Now (see HEAT), we know the amount of heat produced by the burning (in air) of any material whose composition is known. It follows, then, that from the mere quantity and composition of a substance, we can tell the amount of mechanical work due to its combustion; that is, supposing it all to be effective. As we have been led to the mention of heat of combustion, let us consider what this is due to. Combustion (in air) is merely a chemical combination of the constituents of the burning body with oxygen—the heat and light which are developed are therefore, by the conservation of energy, equivalent to the excess of potential energy of the uncombined, over the combined, oxygen and combustible.

That this is the real state of the case—and that the original setting fire to the combustible has nothing to do with the matter, as it is frequently imagined—will be made evident by considering any spontaneous combination, say that of chlorine and copper filings, or of mercury and sodium, etc., in which cases the potential energy lost by the compound appears as heat, light, and sometimes sound.

The equivalents of the other forms of energy have not been even approximated to, with the exception of that of light. Thomson has determined the energy of a cubic mile of sunlight at the earth to be somewhere about 12,000 *foot-pounds*, giving about 10,000 as the *Horse-power* (q.v.) of each sq. foot of the sun's surface. There are some additional difficulties in the way when we seek the equivalent of electric energy, for here the question arises: 'Is there a special substance which is, or the energy of whose motions is, electricity, or does it depend upon motions and distortions of the luminiferous ether?' for we can scarcely suppose it due to motions of the particles of *matter*. If the first, we have as yet no means of estimating its energy; if the latter, we may consider it as within the reach of experiment. It may be remarked here, that Weber's exquisite theoretical statement of electric laws—resting on the fundamental as

sumption that there are two *electric fluids*—requires the admission of mutual forces, which vary with the relative velocity of its particles, and for which, therefore, the conservation of energy does *not* necessarily hold.

Helmholtz, in an admirable paper (*Ueber die Erhaltung der Kraft*, translated in Taylor's *Scientific Memoirs*, New Series, i.), starting from the assumptions above explained, has applied the principle of conservations of energy to the investigation of many recondite problems connected with the physical energies: such of his observations as suit the plan of this article are here given.—A very good example of the conservation of energy is found in the increasing velocity of a planet or comet as it approaches the sun, and thus loses potential energy; and also in the fact that in the case of these bodies the mere distance from the sun, and the velocity at that distance, enable us to tell at once the nature of the orbit described—i.e., which of the conic sections it is.—Latent heat is probably a form of potential energy; depending on the physical state of the substance in which it is stored up. The same may be said of those substances, which, when mixed, produce heat or cold, as water and sulphuric acid, or nitrate of ammonia. It is easily seen that here the heat or cold depends upon a change of molecular arrangement of some kind; that is, a change of the potential energy.—In magnetism and statical electricity, of course, the conservation of energy holds, as we know that all the phenomena can be explained by attractions and repulsions, following the law of gravitation. In the discharge of a Leyden battery, the potential energy lost is reproduced as heat in the connecting wires, and as light, heat, and sound with the disruptive spark. In charging a Leyden jar by means of the electrophorus, the charge is directly produced by the expenditure of mechanical work in overcoming the attraction of the negative electricity of the resinous plate for the positive electricity of the cover.—In the ordinary voltaic battery, the excess of loss of potential energy in the cells by the chemical union, say of zinc and oxygen, and of sulphuric acid and oxide of zinc, over that gained by the decomposition of water, produces the kinetic energy of the current, which may be transformed into heat, light, magnetism, or motion, or two or more. Or it may be employed to reproduce potential energy by chemical decomposition, say that of water. This, by a spark, can be reconverted into kinetic energy as an explosion accompanied by heat, light, and sound. While an electric current causes the motion of a magnetized needle, our general principle should lead us to infer that the current itself will be weakened. This is found to be the case, but, as it should be, *only during the motion* of the needle. The needle in a permanent state of deflection produces no effect whatever. Now, the diminution of an electric current is simply equivalent to the addition of a weaker current passing in the opposite direction. We should expect, then, that the motion of a magnet near a conducting wire will in general produce a current in the latter, and this is, in fact, Faraday's great discovery of

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magneto-electric induction. In this case, the current ceases so soon as the magnet ceases to move relatively to the wire.

If a mass of copper or other good conductor be set in rapid rotation near a powerful magnet, the motion produces electric currents in the copper, which, being attracted by the magnet, soon bring the mass to rest. It is not so clear in this case into *what* the mechanical energy of the rotation has been transformed, especially as the electric currents cease with the motion; but if we keep up the rotation forcibly, we find in a short time the copper growing warm; in other words, the energy has been transformed into electric currents, and the latter into heat. This beautiful experiment is due to Joule, and has been repeated in a striking popular form by Foucault.

Advantage has been taken by Faraday of the phenomena of induction, to produce electric currents by aid of the earth's magnetism. His apparatus is simply a revolving disk of metal, and the terminal wires touch, one its axis, the other its edge. The energy which is here transformed into electric currents is the additional effort requisite to turn a *conducting* disk, instead of an equal *non-conducting* one. It is a curious consequence that in all metallic machinery a portion of the energy of the prime mover is lost in producing electric currents, and finally heat, in the moving parts, so that heat in such cases is not entirely, though very nearly, due to friction alone.—Perhaps one of the most singular of these transformations of energy is that already referred to of heat into electric energy. Certain crystals, such as tourmaline, become electrified by heat; but electric *currents* can be produced by simply heating a *junction* of two wires or bars of different metals, the other ends also being in contact. Now, if we were to heat the other junction, it is obvious that, as at it the metals are arranged in the opposite order, we should produce a contrary current; conversely, by cooling them we should strengthen the first. But the conservation of energy requires that such a junction should be heated or cooled according to the direction in which a current passes through it. This was discovered by Peltier.

Animal energy is simply a transformation of the potential energy of food. This is well illustrated by the increased diet requisite when man or beast abruptly changes from a state of inactivity to one of toil, as with a polar bear after his winter's sleep; or by the greater amount and better quality of food necessary for criminals subject to hard labor, than for those merely imprisoned.

Since, then, as far as we have yet seen, there is no such thing as gain or loss of energy anywhere, while it appears that the ultimate transformation of such energy is heat, and that the latter tends to a uniform diffusion or dissipation, in which it is unavailable, as far as we know, for further transformation (see HEAT), whence do we procure the supplies of energy requisite to maintain the economy of life? We answer: Chiefly, or indeed entirely, from the sun, whence they come as light and radiant heat, perhaps

in other forms. Without the sun, where would be vegetation?—without vegetation, where animal life? Where would be our stores of fuel, whether wood or coal? It is entirely then, we may say, to the directly supplied energy of the sun that we look for the maintenance of life; and this leads to a question not of much importance to ourselves, to be sure, but of vast future consequence to the human race: Is this supply finite? Will the sun in time have given off all its energy, or is it continually receiving accessions itself, and if so, has it an inexhaustible store to draw from? Now, whether the sun be a hot mass, or be surrounded by an atmosphere in an intense state of combustion, or whether it derive the main part of its heat, as Thomson supposes, from gravitation (in a way presently to be considered), it is certain that, as far as we know, it must at some period be exhausted. Such is the apparently inevitable verdict of the conservation of energy. The gravitation theory of the origin of energy generally may be given in some such form as this: The matter in the universe, in a state of coarser or finer division, originally filled all space, and possessed, therefore, by virtue of gravitation, a certain amount of potential energy. As particles gradually moved up to each other, and became slowly agglomerated into masses, more and more of this energy was realized in its kinetic form; some as heat (that of the sun, or the internal heat of the earth, etc.), some as vis-viva of axial or orbital rotation, etc. There still remains unagglomerated in space (see ZODIACAL LIGHT: AEROLITES: COMETS: NEBULÆ) much of this original matter still falling mainly toward the larger masses, as the sun and stars, and exchanging its potential for kinetic energy. But the latter, as we have seen, tends ultimately to become heat, and to seek a uniform diffusion. This, then, it appears, is to be the last scene of the great mystery of the universe—chaos and darkness as ‘in the beginning.’

An immediate consequence of the truth of the conservation of energy is the impossibility of what is usually understood by the Perpetual Motion (q.v.); for it is to be carefully remembered that perpetual motion, in the literal sense of the words, is not only possible, but very general. If there were no such thing as friction, or if we had a perfectly smooth body, in the form of a tectotum, for example, it would spin for ever in vacuo with undiminished speed. The earth in its axial rotation affords a good example. Were it a perfect sphere, and of uniform material, the other masses of the system could produce no effect whatever on its rotation, and the latter would remain for ever unchanged. And even, as we have already seen, when one form of kinetic energy, as electricity, or ordinary vis viva, is lost, we find it reappearing in other forms of kinetic energy, such as heat and light. But this is not the technical acceptation of the term, ‘the perpetual motion;’ it is popularly understood to mean a source of motion which will not only preserve its own vis-viva unchanged, but also *do work*. This is, of course, incompatible with the conservation of energy, for wherever work is done, equivalent

energy in some form or other is consumed. The ordinary attempts to obtain 'the perpetual motion' which are still being made in hundreds by visionaries, are simply absurd, based as they are for the most part on ignorant applications of mechanics. There is absolute impossibility here; and a 'perpetual motionist' of the common herd is far more infatuated than a 'squarer of the circle;' for the latter's problem *may* conceivably be solved, though certainly not by the means usually employed, or in the form usually sought for.

The chief *theories* of the various forms of energy which have been advanced of late times, all assume at the outset forces of attraction or repulsion between particles; or else a highly elastic fluid, or rather solid, if we may so call it, in which the particles of matter float, or are imbedded. We have already considered the difficulties attending the latter supposition; but it is the only one which does not refer force back to force, thus apparently leaving the question where it found it. We may dismiss it with the remark, that a fluid or quasi-solid absolutely continuous and alike in every part is difficult to conceive; and it is hard to understand how motion can be propagated through it. If it be not continuous, forces must be supposed to be exerted by its parts on each other, else the motion of one part would not affect the others. There is one way in which the latter difficulty has been attacked, which seems plausible enough; and that is, that the particles of this fluid are in a state of rapid motion, and continually impinging on each other and on the particles of matter, no forces being exerted except those of pressure at the impact. This is the notion of Le Sage. But, unless these particles be supposed *elastic*, their motion would be lessened at every impact, and destroyed completely if the impact were direct. This objection seems very strong. The first-mentioned theory, that of Epinus and Mosotti, assumes that material particles float in a general atmosphere of ether, that the particles of each repel one another, but that a particle of matter attracts one of ether. From these suppositions, and an hypothetical law connecting pressure with density in such an ether, Mosotti has deduced gravitation and the molecular forces; but to apply the hypothesis to the other physical energies, other suppositions are necessary. These have been supplied by Clausius and Redtenbacher, who, with the assumptions of particles of matter and of ether as before, imagine those of matter to attract each other, and also those of ether, but the latter to be mutually repulsive. Light and radiant heat, according to this theory, are vibrations of the ether which fills all space between the particles of matter, or rather, between the atmospheres of ether which, by the foregoing assumptions, the particles of matter will collect about them. Heat consists of vibrations of the molecules of matter, or of the groups of atoms (see *ATOMIC THEORY*) of which the molecule of a compound body is built up, together with their atmospheres. Electricity, magnetism, etc., are explained to be rotations in the atmospheres. Redtenbacher and Clausius are not

FORCE.

quite agreed as to the physical energies corresponding to each of these forms of motion, but the above gives a general idea of the nature of their speculations.

Probably the most startling of all reflections ever made on F., and its ultimate nature, are those of Faraday. Without calling in question in ordinary cases the truth of the conservation of energy, he has endeavored, by experiment (the only genuine test in a question so novel and so profound), to prove what may be called the Conservation of Force. Here we understand *force itself* and *not energy*. He argues thus: Two masses, according to the undisputed law of gravitation, attract with four times their mutual force if their distance be diminished to half; and with only one-fourth of the same, if their distance be doubled. He asks *whence* comes the additional force in the former, and *what becomes* of the lost force in the latter case? Now, it is evident that this is a new question, totally distinct from any that we have yet considered. To answer it, we must know *what* force is. Would gravitation have any existence if there were but one particle of matter in the universe, or does it suddenly come into existence when a second particle appears? Is it an attribute of matter, or is it due to something between the particles of matter? Faraday tried several experiments of an exceedingly delicate kind, in order to find some answer to his question. A slight sketch of one of them must suffice. A pound-weight is not so heavy at the ceiling of a room as it is when on the floor; for, in the former case, it is more distant from the mass of the earth than in the latter. The difference for a height of 30 ft. is (roughly) about $\frac{1}{350000}$ of a pound. Now, if a mass of metal be dropped through such a space an additional force, $\frac{1}{350000}$ of its weight, is called into play, and the object of the experiment was to detect whether electrical effects accompanied this apparent *creation* of force. The mass, therefore, was a long copper wire, whose coils were insulated (see ELECTRICITY) from each other, and whose extremities were connected with those of the coil of a delicate Galvanometer (q.v.). Had any trace of an electric current been produced, the needle of the galvanometer would have been deflected, but, when all disturbing causes were avoided, no such deflection was detected. Other experiments with a view to the detection of other physical energies, were also tried, but, like the first, with only negative results.

We must not hastily conclude that there is such a *thing* as force, though we are in the constant habit of speaking about it. Our sensations are all more or less misleading until we can interpret them. The pain produced by a blow is quite a different thing from the energy of motion of a cudgel; and when our muscular sense impresses on us the idea that we are exerting force, we must be cautious in our conclusions. For it is certain that force is *merely the rate per unit of length* at which energy is transferred or transformed.—(See CONSTITUTION OF MATTER).

There are, in mechanics, several other quantities which retain a fixed value under certain circumstances; the following are a few of them,

FORCE AND FEAR.

Conservation of Areas. Invariable Plane.—We have seen (CENTRAL FORCES) that if a particle move about a centre of force, its motion is confined to a plane, and its radius vector traces out equal areas in equal times. Similar theorems hold in any system of particles acted on only by their mutual attractions. If in such a system we suppose the positions of the respective particles to be continually projected (orthogonally, see PROJECTION) on *any* fixed plane, and radii vectores to be drawn from *any* point in that plane to the projections—the sum of the areas swept out by all those radii vectores will be equal in equal times. Also, this being true of all planes, there is one for which this sum is a maximum, and *this plane is fixed in space*. It is thence called the invariable plane of the system. Similar propositions hold for a system of bodies each of finite size, their several axial rotations being taken into account; hence what is called the Invariable Plane (q.v.) of the Solar System.

Conservation of Momentum.—When two masses attract or impinge, the forces that they exert on each other are evidently equal and opposite. Now, the measure of a force is the momentum that it produces; hence equal and opposite momenta, in addition to their original quantities, will be communicated to the masses, and therefore the sum of the momenta of the two, resolved in any direction, will be unaltered; hence, *the sum of the momenta of any number of bodies will be unaltered by mutual actions either of the nature of attraction or impact*.

Conservation of the Motion of the Centre of Gravity.—Again, in such a system, the momentum of the whole collected at its centre of inertia, resolved in any assigned direction, is the sum of the momenta of the separate bodies in that direction; hence, *the centre of inertia of a system, subject to none but the mutual actions of its components, either remains at rest, or moves uniformly in a straight line*.

For a simple, and as far as possible non-technical, discussion of the subjects briefly noted above, see Tait's *Recent Advances in Physical Science* (2d ed.).

FORCE AND FEAR: in *law*, working invalidation of contracts. As consent is of the essence, or rather is the essence of all contracts, and as consent implies not only intelligence, but unfettered power of action in the consenting parties, contracts, by the laws of all civilized nations, will be invalidated if it shall be proved that they were entered into under the influence of force or fear. Circumstances which constrain the will have the same effect as those which blind the understanding, and the law of force and fear is consequently closely analogous to that of Fraud (q.v.), including under that head misrepresentation, concealment, and consequent Error (q.v.). But it is not every degree of constraint, however exercised, which will have this effect in law. On the contrary, it must be of such a description as may be reasonably supposed to influence the will of the party in the circumstances in which he is placed at the time. In determining, therefore, whether there really has been force or fear in the legal sense, the law will take into account the age, sex, education, and other per-

sonal characteristics of the party, with the accidental circumstances in which he was placed, e.g., the state of his health and spirits at the time, whether he was alone, what anxiety he may have felt for the life or interest of others, and the like. But 'where there is no peculiar weakness of age or sex, or condition,' says Mr. Bell, stating the law of most countries, 'law will require, in order to annul a contract, such fear and compulsion as may reasonable shake a mind of ordinary constancy and resolution, and will not listen to the pretense of every vain and foolish fear.'—*Com.* I. p. 22, Shaw's ed. As a contract invalid on the ground of force and fear is not only incapable of being enforced after its invalidity has been ascertained by legal process, but from the absence of consent was invalid *ab initio*—i.e., was no contract at all, in a legal sense, the object of the law is to restore the parties to the position in which they were before it was entered into. All moneys which have been paid under the provisions of the extorted contract must consequently be repaid, and reparation as far as possible must be made by the payment of damages for such personal injuries as the party who was dragged into it may have suffered from the enforcement of its provisions: see REDUCTION. By the law of England, Duress (q.v.) which will invalidate a contract must amount to fear of the loss of life or limb called Mayhem. 'Whatever is done by a man to save either life or member,' says Blackstone, 'is looked upon as done upon the highest necessity and compulsion. Therefore, if a man, through fear of death or mayhem, is prevailed upon to execute a deed, or do any other legal act, these, though accompanied with all other the requisite solemnities, may be afterwards avoided.' But 'a fear of battery or being beaten, though never so well grounded, is no duress: neither is the fear of having one's house burned, or one's goods taken away and destroyed, because in these cases, should the threat be performed, a man may have satisfaction by recovering equivalent damages.'—Stephen's *Com.* i. p. 142. The avoidance of such a contract is, however, dependent on the will of the injured party. 'A contract made under duress may be avoided by the person whose free-will was thus restrained, though he has also an election, if he thinks proper, to insist upon it as a binding transaction' (*Ib.* vol. ii. p. 62). But the parties who are entitled to treat a contract either as a nullity or a subsisting contract, must make their election, and cannot, after treating the contract as rescinded, set it up as a subsisting contract (Addison on *Contracts*, pp. 273, 436, and 1074).

FORCELLINI, *for-chěl-lē'nē*, EGIDIO: 1688, Aug. 20—1768; b. in a village near Padua: Italian philologist. Owing to the poverty of his family, F. had not the benefit of early instruction, and was already verging toward manhood when beginning a regular course in the seminary of Padua. There he was notable for industry and quickness in learning, and was chosen by the learned principal, Giacomo Facciolati to aid him in the compilation of a lexicon, a work which probably inspired both with the

FORCENÉ—FORCER.

project on which F.'s literary repute is based—viz., the compilation of a vast and comprehensive vocabulary of the Latin language. The work, published after F.'s death, was one of the most valuable acquisitions to philological science of the age. In addition to the Italian and Greek signification of the Latin word, the literal and figurative application of each expression is given in a collection of examples, in themselves a perfect compendium of knowledge embracing the customs, laws, arts, sciences, religion, and history of the Romans. This immense work was published in 4 vols., folio, under the title, *Totius Latinitatis Lexicon, consilio et cura Jac. Facciolati, opera et studio Aeg. Forcellini Lucubratum* (Padua, 1771). Furlanetto's appendix appeared 1816 (Padua), and a new ed. of the complete work was published 1828 (Padua).

FORCENÉ, in Heraldry: applied to a horse when rearing or standing on his hinder legs.

FORCEPS, n. *för'sěps* [L. *forceps*, a pair of tongs—from *foris*, out of doors, without; *capio*, I take: It. *forcipe*: F. *forceps*—*lit.*, the thing for taking forth or out]; kind of pliers or small tongs used in *surgery*, etc.; an instrument of great antiquity, used as a substitute for the fingers, and consisting of two levers of metal jointed together crosswise, nearer to one end than the other. The hand grasping the longer ends of the levers or handles, closes the shorter ends which are shaped so as to seize firmly the intended object. There is scarcely a surgical operation in which it is not applied; and it is made of various forms, to suit different cases. In addition to the forms used in dentistry (q.v.), there is e.g., the *dissecting* forceps, which has roughened points, to lay hold of small portions of tissue which are to be divided by the knife; the *lithotomy* forceps, again, has blades concave like spoons; and *fenestrated* forceps have apertures in the blades, and as the soft tissues project into these, a firm hold is obtained with less risk of tearing the parts. By means of Liston's *cutting* forceps, a powerful hand can divide a great thickness of bone. But the most important of all is the *midwifery* forceps, an invaluable invention, in cases of difficult delivery, which daily rescues from suffering and danger numerous mothers and infants. It was gradually brought to its present perfection; but the name of Chamberlen, an accoucheur of the time of James II., is associated with it, as one of its chief improvers. It consists of two concave fenestrated blades, forming a cavity into which the head of the child fits. The blades are applied separately, one to each side of the head, and then locked together. Holding by the handles, the accoucheur aids the natural efforts of labor. The instrument does not necessarily or generally injure either mother or child. FORCIPATED, a. *för'si-pā-těd*, formed to open like a pair of pincers. FORCIPATE, a. *-pāt*, pincer-shaped. *Note.*—Other probable derivations—*forceps*, as if *ferriceps*—from *ferrum*, iron and *capio*, I take; or from *formus*, hot, and *capio*=that which seizes and holds a hot thing.

FORCER, n. *för'sér* [OF. *forcier*—from mid. L. *forsāriūs*, a coffer] in *O.E.*, a strong box for valuables; a safe.

FORCING—FORD.

FORCING, in Gardening: hastening the growth of plants by artificial means; employed principally in the early spring to enable the gardener to supply various edible plants several weeks earlier than they could be grown in the open field. F. is applied mostly to garden vegetables and flowers, but some of the small fruits, as the strawberry, are sometimes forced into early bearing. The principal means for F. adopted by gardeners, are the cold-frame and the hot-bed. The former consists of a sloping frame or box (located in a sheltered place and covered with glass), in which seeds can be sown some weeks earlier than in unprotected situations. In the hot-bed (see **HOT-BED**), owing to the heat generated therein, seeds may be planted still earlier. The sowing may be done in shallow boxes which have been filled with fine, rich earth, or in the surface-soil of the bed itself; the former method is preferable. Among the principal plants which are forced for the market are the beet, cauliflower, early cabbage, and lettuce. A little later in the season the tomato, egg-plant, and cucumber also can be forced advantageously. The time for sowing varies with the latitude and the plants to be grown. In the Middle States sowing in hot-beds can be commenced early in Feb., and in cold frames by Mar. 1. In forcing plants constant care is required to prevent injury, by either of the extremes of too close an atmosphere or too low a temperature. Fresh air must be occasionally given or the plants will rapidly increase in height, but be lacking in vigor and hardiness; while if too cold air is admitted, or the glass is raised too long, the plants will be injured or destroyed by the exposure. In very cold weather the sashes should be covered with straw or matting and the sides banked with earth. It is desirable to transplant into other boxes, or other portions of the bed at least once, and a gradual 'hardening' of the plants by exposure to the outside air must be effected before they are placed in the open field.

FORD, n. *förd* [Ger. *furt*; Icel. *brot*; Pol. *brod*, a ford]: part of a river or other water so shallow that it may be passed without floating or swimming; a place established for such crossing—often becoming part of a town-name; e.g., Oxford, Stratford, Deptford, Hungerford, etc., English towns built around ancient fords. In selecting the safest place for fording a river, the *widest* part should be chosen, as, wherever a certain quantity of water is flowing, the wider its bed—the rapidity of the flow being the same—the shallower it must be. At the bend of a river, the line of shallow water does not run straight across, but extends from a promontory on one side to the nearest promontory on the other. The stream usually runs deep along hollow curves, and beneath steep perpendicular and overhanging banks, while it is shoal in front of promontories unless the promontory is formed by a jutting rock. For safe fording on foot, the depth of water should not exceed three ft.; on horseback four ft.; or a foot less for each, if the current be very strong. The bottom of a ford should be firm and even; weeds, blocks of stone, etc., are

FORD.

serious obstacles, especially for cattle. When a caravan, a number of troops, or of cattle have to cross, a sandy bottom is very bad, for the sand is stirred up and carried away by the stream and renders the ford impracticable for the hindmost. For a small party, hard sand or gravel is the safest bottom. Fords are continually varying, either from the swelling of the river or the shifting of its bed or banks; and the place reported by one traveller as a safe ford, is not certain to be found so by the next. Residents near should be consulted. FORD, *v.* to pass over a river by wading or walking. FORD'ING, *imp.* FORD'ED, *pp.* FORD'ABLE, *a.* -*ă-bl*, that may be passed through on foot FORD'ABLENESS, *n.* -*bl-nēs*.

FORD, JOHN: English dramatist: date of birth not known, but he was baptized in Ilsington Church, 1586, April 17; second son of Thomas F. of Ilsington, co. Devon; date of death unknown. His family was connected with the famous Lord Chief Justice Popham and he became a member of the Middle Temple 1602; unlike many of the poetic tribe, F. seems to have adhered to his studies, and to have attained some professional success. His first poem was an elegy on the death of the Earl of Devonshire, *Fame's Memorial*. In 1629, he produced *The Lover's Melancholy*; and four years later, *The Broken Heart* and *Love's Sacrifice*. Next year came *Perkin Warbeck*; and 1638-9, *The Fancies Chaste and Noble* and *The Lady's Trial*. After this, F. drops out of literary history. Some think that he died soon afterward; others, that he retired to his native place, married, and lived to an old age. F. takes high position as a dramatist, more by general mental force than through dramatic instinct or poetic genius. In his compositions, there is a sense of effort: his versification—even when the subject-matter is distinctly noble—is hard and prosaic. He has no humor. He has been praised for his pathos, but in his pathetic scenes effort is apparent. He cannot 'flatter' you to tears, as Shakespeare and the greater poets do. An edition of his works published by Moxon (Lond. 1840), is enriched by biographical and critical notices by Hartley Coleridge; another by the Rev. Alex. Dyce, appeared 1869.

FORD, PAUL LEICESTER: an American author, 1865-1902, May 8, b. in Brooklyn, N. Y. His death by the hand of a brother, who also took his own life, was a most pathetic tragedy. His works include *The Honorable Peter Stirling*, *The True George Washington*, *Bibliotheca Hamiltonia*, *Franklin Bibliography*, *Janice Meredith*, and an edition of the works of Thomas Jefferson, with biographical introduction, notes, etc. Other works were *Short Stories*, *The Story of an Untold Love*, *Tattle Tales of Cupid*, etc.

FORD, WALTER: an American song-writer, about 1860-1901, March 6. In connection with John W. Bratton he published about 100 songs, of which he wrote the words. These include *Darling Sue*, *Isabel*, *Sunshine of Paradise Alley*, *I Love You in the Same Old Way*, and *At the Sound of the Sunset Gun*.

FORDHAM—FORE.

FORDHAM, *förd'am*: formerly post village of Westchester co., N. Y., 10 m. from Grand Central Depot; since 1874 part of the co. and city of New York; on the New York and Harlem railroad. It contains 4 churches, a number of noted Rom. Cath. institutions, including St. John's College, which has a library of nearly 20,000 vols., a theol. school, ladies' acad., and female deaf-mute asylum. In F. was Jerome Park, the fine race-course of the American Jockey Club, now the site of a new reservoir.

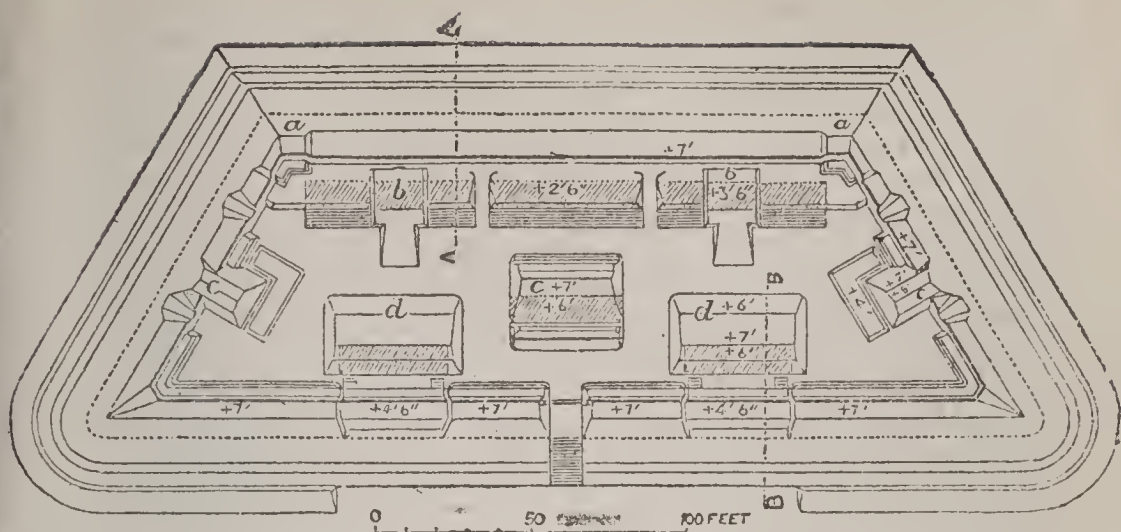
FORDO, *v. för-dó'* [*for*, against, and *do*]: in *OE.*, to ruin; to destroy; to weary. **FORDID'**, pt. ruined. **FOR-DONE**, pp. *-dün*, overcome; wearied with labor.

FORDUN, *for-dün'*, **JOHN OF**: early Scottish chronicler, a secular priest, who wrote about 1380. Nothing more is known about him, though it has been inferred from his name that he was born at Fordun in Kincardineshire, and it has been said that he was a canon of the cathedral church of Aberdeen. Having proposed to himself the compilation of a chronicle of Scotland, he is said to have travelled on foot through Britain and Ireland in search of materials. He lived to write only five books of his *Scotichronicon*, bringing the history down to the death of King David I. 1153. He left collections extending to 1385, about which time he is supposed to have died. The work which John of F. left unfinished was resumed 1441 by Walter Bower, abbot of the monastery at Inch Colm, in the Firth of Forth. He enlarged F.'s five books, and making use of his collections as far as they went, wrote 11 new books, bringing the *Scotichronicon* down to 1437; but he also made many arbitrary alterations from F.'s narrative. The work is the chief authority for the history of Scotland prior to the 15th c.; its value being greatest during the 14th c. when it is contemporary. It exists in more than 20 mss., the principal of which is in the Wolfenbüttel library. Four printed editions have been published; the best is edited by W. F. Skene (2 vols. Edinburgh 1871-2), from the text of the Wolfenbüttel and other standard mss.: Bower's interpolations and additions are separated from F.'s text.

FORE, *a. för* [Ger. *vor*, before—another form of **FOR**, which see]: in front of; coming or going first; preceding. **FORMER**, *a. för'mër*, before another in time or order. **FOREMOST**, *a. för'möst*, first in place or rank. **FORE AND AFT**, among *seamen*, the whole length of the ship from end to end—*fore* meaning front or first part, and *aft* the behind or hinder part; in the direction of a ship's length from stem to stern. As a prefix, *fore* generally means priority in time; before; front part.

FORE, prep. *för* [see **FORE** 1 and **FOR** 1]: in *Scot.*, signifying priority. **TO THE FORE**, in the front; in *Scot.* still living; above ground; not expended (see **FORE**, above).

FORE, in Nautical Matters: the front or foremost part of a ship. The *forehold* is that part of the hold between the cutwater and the foremast. The *forecastle* [see below] is that portion of the upper deck extending from the fore-

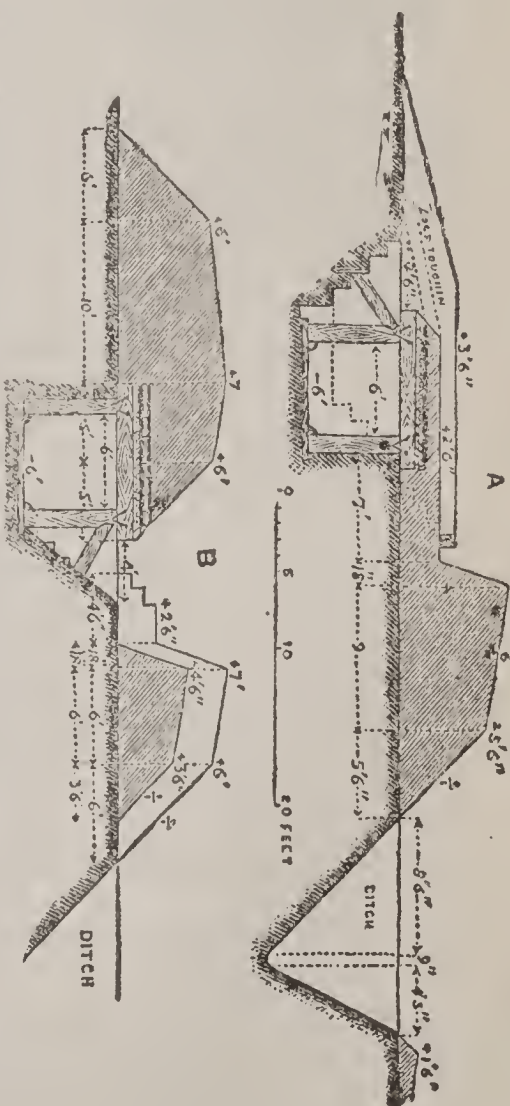


Fortification.—Fig. 1. Plan of Field Redoubt: *a, a*, Bonnettes; *b, b*, Barbettes; *c, c*, Traverses; *d, d*, Parados. The diagonal shading indicates the position of casemates. *Note.*—In this, and in figs. 2, 3, and 4, the reliefs are given in feet relatively to the plane of site (x above, — below).



Wood Forget-me-not (*Myosotis sylvatica*): *a*, A flower.

Fortification.—Fig. 2. A, Section through face, AA, fig. 1; B, Section through gorge, BB, fig. 1.



FOREADVISE—FORECLOSE.

fast to the bow; it is the part to which the common sailors have free access, and probably derives its name from a small turret or castle placed near the prow in ancient vessels, from which darts and other projectiles could be most conveniently hurled upon an enemy: the term includes also the part under the main deck forward where the sailors sleep and eat. *Foremast* is the first or front mast; surmounted by the foretop-mast, foretopgallant-mast, and foreroyal; its sails being foresail, foretopsail, etc.; between it and the bow flies the forestaysail hoisted on the forestay, a massive rope passing from the foretop to the bow, and, with the backstays and shrouds, maintaining the mast perpendicular. *Forebraces* are ropes passing from the extremities of the foreyard into the maintop, whence they descend through pulleys to the deck where they serve, when necessary, to alter the direction presented by the foresail to the wind.

FOREADVISE, v. *för'äd-viz'* [*fore*, and *advise*]: in *OE.*, to warn before the action or event happens.

FOREARM, n. *för'ärm* [*fore*, and *AS. earm*, the shoulder-joint]: the part of the arm between the elbow and the wrist.

FOREARM, v. *för-ärm'* [*fore*, and *L. arma*, weapons]: to prepare for attack or resistance before the time of need. **FOREARM'ING**, imp. **FOREARMED'**, pp. *-ärmd'*.

FOREBEARS, or **FORBEARS**, n. plu. *för-bärz'* [*AS. for*, before: Goth. *bairan*, to produce children: Icel. *furdr*, bearing children]: in *Scot.*, forefathers; ancestors.

FOREBODE, v. *för-böd'* [*fore*, and *bode*: Icel. *fyrir-boda*]: to foretell; to feel a secret sense of something future—usually applied to evil. **FOREBO'DING**, imp.: **ADJ.** presaging; ominous: **N.** perception beforehand. **FOREBO'DED**, pp. **FOREBO'DER**, n. one who.—**SYN.** of 'forebode': to augur; presage; betoken; prognosticate; portend; predict.

FOREBY, prep. *för-bi'* [*for*, and *by*]: in *OE.*, near by; fast by. **FÖRBYE'**, in *Scot.*, over and above; besides.

FORECAST, v. *för-käst'* [*fore*, and *cast*]: to foresee; to plan before execution. **FORECAST'ING**, imp. **FORECAST'ED**, pp. **FORECAST**, n. *för'käst*, previous contrivance; foresight. **FORECAST'ER**, n. one who.

FORECASTLE, n. *för'käs-l* or *fök'sl* [*fore*, and *castle*]: forepart of a ship, formerly much raised and in the form of a castle; the part of the upper deck forward from the foremast; the forward part under the main deck in merchant ships where the sailors live.

FORE-CHOSEN, a. *för-chö'zn* [*fore*, and *chosen*]: chosen beforehand.

FORECITED, a. *för-si'ted* [*fore*, and *cited*]: quoted before or above.

FORECLOSE, or **FORCLOSE**, v. *för-klöz'* [*for*, against, and *close*: *F. fors*, without; *clos*, closed, shut up: *F. foreclose*, to foreclose]: to close or shut against; to put an end to; to preclude. **FORECLO'SING**, imp. *-z'ing*. **FORECLOSED'**, pp.

FORE-DATE—FOREGO.

-klōzd', precluded; cut off from the right of redemption—usually said of a mortgage. **FORECLOSURE**, n. *-klō'zhūr*, act of foreclosing; prevention; in *law*, proceeding by which a mortgagee gains possession of the property of a mortgagor unable to pay either principal or interest of a loan made on the security of the property. The mortgagor has an equity of redemption in his property as long as he can pay the interest, but when no longer able the mortgagee may file a bill calling on the mortgagor, in a court of equity, to redeem his estate within a specified period, or, in default thereof, to be forever closed or barred from any right of redemption. In N. Y., Ind., Ky., Md., S. C., Tenn., and Va., the practice is for the mortgagee to obtain a decree for a sale of the land under the direction of an officer of the court, in which case the proceeds are applied to the discharge of the incumbrances according to their priority. Should the sale yield more than the aggregate of principal and unpaid interest, the surplus is turned over to the mortgagor. In some states a mortgage is foreclosed without a sale, and in such case an extension of time is granted the mortgagor, and under some state laws the proceedings in foreclosure extend over an entire year, particularly if the mortgagor charges fraud or resists, see **MORTGAGE**. *Note.*—*Fore* in 'forego' and 'foreclose' does not mean 'before,' but 'against, across,' and is therefore an erroneous spelling of *for*.

FORE-DATE, v. *fōr-dāt'* [*fore*, and *date*]: to date before the true time. **FORE-DECK**, n. *-děk*, the forepart of a ship. **FORE-DESIGN**, v. *-dě-sīn'*, to plan beforehand; to intend previously. **FORE-DETERMINE**, v. *-dě-tēr'mīn*, to decree beforehand.

FOREDOOM, v. *fōr-dōm'* [*fore*, and *doom*]: to doom beforehand. **FORE-DOOR**, n. *-dōr*, the door in front of a house.

FORE-END, n. *fōr'-ēnd* [*fore*, and *end*]: in *OE.* and *Scotch*, anterior part; the end or part which comes before; the stem of a ship. **AFT'-END**, the stern or hinder part.

FOREFATHER, n. *fōr'fā-thēr* [*fore*, and *father*]: an ancestor. — **SYN.** of 'forefathers': ancestors; progenitors; predecessors; forebears.

FOREFEND, v. *fōr-fēnd'* [*fore*, and *fend*]: to ward off; to keep off; to hinder; to prevent approach; to prohibit. **FOREFEND'ING**, imp. **FOREFEND'ED**, pp.: see **FORFEND**.

FOREFINGER, n. *fōr'fīng-gēr* [*fore*, and *finger*: perhaps *OE. forme*, first, and *finger*]: the finger next the thumb.

FOREFOOT, n. *fōr'fūt* [*fore*, and *foot*]: one of the front feet of an animal.

FOREFRONT, n. *fōr'frūnt* [*fore*, and *front*]: the front part.

FOREGO, v. *fōr-gō'* [*fore*, before, and *go*]: to go without; to give up; to forbear to possess or enjoy. **FOREGO'ING**, imp. giving up: **ADJ.** preceding; going before. **FOREGONE**, pp. *fōr-gōn'*, given up: **ADJ.** made up or decided beforehand,

FOREGROUND—FOREIGN ATTACHMENT.

FOREWENT, pt. *för-wěnt'*, went before; preceded; gave up.
Note —Some English authorities make a distinction between *forego* and *forgo*: *forego*, to go before; *forgo*, to go against or without. But English usage is not uniform in observing this distinction; and in the United States, both meanings are combined under *forego*, and the form *forgo* is not in use.—
SYN. of 'forego': to quit; relinquish; leave; resign; renounce; abandon; abjure;—of 'foregoing': antecedent; previous; former; anterior; prior.

FOREGROUND, n. *för'ground* [*fore*, and *ground*]: that part of a picture which appears to lie nearest the eye of the observer.

FOREHAND, a. *för'hånd* [*fore*, and *hand*]: done sooner than is regular; in *Scotch law*, rent of a farm made payable before the crop, of which it is the rent, has been reaped: N. the part of a horse before the rider; in *OE.*, preference; advantage. **FORE'HANDED**, a. *-hånd-ēd*, early; timely.

FOREHEAD, n. *för'ēd* [*fore*, and *head*]: the part of the face extending from the hair of the head to the eyes; the brow. **FORE'HORSE**, n. *-hōrs*, the horse which goes foremost.

FOREHEND, v. *för-hēnd'* [*fore*, and *OE. hend*, to seize, which see]: in *OE.*, to be seized; to be laid hold of. **FOREHENT'**, pp. *-hēnt'*, seized; laid hold of.

FOREIGN, a. *för'in* [*F. forain*; *It. forense*, belonging to what is without—from *mid. L. forānēūs*, that which is without, strange—from *foris*, out of doors—*lit.*, that is without]. external; alien; belonging to another nation or country; not to the purpose; remote; not native or natural. **FOR'EIGNER**, n. *-ēr*, one belonging to another country; not a native (see **ALIEN**). **FOR'EIGNNESS**, n. *-nēs*, remoteness. **FOREIGN-PLEA**, in *law*, plea objecting to a judge on the ground that he has not cognizance of the subject-matter of the suit.—**SYN.** of 'foreign': extraneous; outside; without; remote; extrinsic; outlandish; exotic; strange; excluded.

FOR'EIGN ATTACH'MENT: legal attachment or arrestment of a citizen of one country in another country. It may have reference either to person or to property. In several states the laws provide for such process and for levy on the property of absconding or non-resident debtors; but the laws of different states vary in details.—The several states of the American Union are not counted *foreign* to each other: the Constitution (q.v.) provides that each shall give full faith and credit to the public acts, records, and judicial proceedings of every other state. The congress is to provide the legal methods for proving and giving efficiency to the judicial decisions of each state in every other; and this is accomplished universally except in regard to Divorce—in which particular the laws thus far are grievously deficient.—See **ATTACHMENT**: **ARREST**: **ARRESTMENT**: **APPREHEND**: **FOREIGN COURTS**: **FOREIGN JUDGMENT**: **FOREIGN LAWS**: **GARNISHMENT**. A defendant arrested or attached in a foreign country may be again arrested in his own country on the same ground of action.

FOREIGN BILL OF EXCHANGE.

FOREIGN AUXILIARIES, in the British and other armies. In early English history, F. A. were common. Harold had a body of Danes in his army when he defeated the Norwegian king; and to their refusal to march against the kindred Normans he owed one of the chief complications which ultimately overwhelmed him. In modern times, William III. had for some time a body of Dutch troops in his pay as king of England: throughout the 18th c. Hessian and Hanoverian regiments were constantly in the pay of the English govt. for temporary purposes. Hessians fought for England in the American Revolution; and the Landgrave of Hesse, who sold his troops at so much a head, received more than £500,000 for soldiers lost in that struggle. During the Irish rebellion 1798, many Hessian troops were employed.

In 1794 during the continental war the 'King's German Legion,' of 15,000 men, were embodied in the British army, and were later increased to nearly 30,000. They distinguished themselves in various engagements. Corps of French *émigrés* also, as the York Rangers and others, were organized. All were disbanded 1815.

During the Russian war, in 1854, the British govt. again had recourse to the enlistment of foreigners, under special provision that the legionaries were in no case to be used against British subjects, in the event of internal discord. The numbers to be raised were 10,000 Germans, 5,000 Swiss, and 5,000 Italians; the pay to be the same as to British troops, but with no future claim to half-pay. About half the number of men were enrolled, and were said to have reached great efficiency, when the stoppage of hostilities caused them to be disbanded at a great cost for gratuities, etc.

The Swiss auxiliaries (Swiss Guards) used to form a regular contingent in many of the armies of Europe, especially of France and Italy. Over 1,000,000 served in France from the time of Louis XI, to that of Louis XIV. (1465-1715): see GARDES SUISSES. The Swiss usually served only on condition of being commanded by their own officers, and occasionally these officers obtained distinction and fame. But the privates returned home poor and often demoralized; and the cantons which supplied most mercenaries suffered severely by their absence. After the French Revolution, the cantons ceased publicly to hire out their subjects; and after 1830 most of the cantons forbade foreign enlistment. In 1859 the Confederacy passed a severe law against recruitment for service abroad. There is still, however, a large contingent of Swiss mercenaries in the Dutch E. Indian Colonies. The Papal Swiss troops have shrunk to a body-guard of about 100 men.

FOREIGN BILL OF EXCHANGE': bill either both drawn and accepted in a foreign country, or drawn by a person residing in a foreign country, on a person in this country; or the reverse. If a bill be drawn abroad, and accepted in England, it does not require a stamp; but if drawn in that country upon a correspondent abroad or a foreign house, it must be stamped (19 and 20 Vict. c. 97. ss.

FOREIGN COURTS.

6 and 7); and when drawn abroad, it must be stamped by the holder, before he can present it for payment, or indorse, transfer, or otherwise negotiate it within the United Kingdom (Chitty on *Bills of Exchange*, 72). It has, however, been decided that the stat. 17 and 18 Vict. c. 83, s. 3, does not render a stamp necessary where a bill drawn abroad has been indorsed abroad to a person in England, and presented by him for acceptance in England (Phillimore, *International Law*, iv. 609). Formerly, a bill drawn or payable in Scotland or Ireland, was foreign in England; but such bills were made inland by the statute just mentioned; and the same regulation was extended to the islands of Man, Guernsey, Jersey, Alderney, and Sark (s. 7). See BILL. It is the usual rule, that the liabilities of the drawer, the acceptor, and indorser, shall be governed by the laws of the countries in which the drawing, acceptance, and indorsement respectively took place (Phillimore's *International Law*, iv. 606, 506). In the case of bills both drawn and accepted in a foreign country, and which are thus in reality foreign contracts, but of which the acceptor is a native of this country, and which he seeks to enforce in the court of his own country, a distinction is made between the contract and the remedy: 'Whatever relates to the nature of the obligation—*ad valorem contractus*—is to be governed by the law of the country where it is made—the *lex loci*; whatever relates to the remedy, by suits to compel performance or by action for a breach—*ad decisionem litis*—is governed by the *lex fori*—the law of the country to whose courts the application is made for performance or for damages.'—Lord Brougham in *Don v. Lippman*, House of Lords, 1837, May 26; Shaw and Maclean II. 723. See BILL OF EXCHANGE.

FOREIGN COURTS: tribunals of law in foreign countries. Chancellor Kent, after stating that in cases not governed by the constitution and laws of the United States, the doctrine of the English law, as to the force and effect to be given to foreign judgments, is the law of this country also, observes, that the law thus common to England and America 'is exceedingly, if not peculiarly liberal, in the respect which it pays to foreign judgments, in all other cases except the case of a foreign divorce or an English marriage. A distinction was early taken by Lord Nottingham, and is now recognized both in England and America, and indeed almost everywhere else, between a suit brought to enforce a foreign judgment, and a plea of a foreign judgment in bar of a fresh suit for the same cause. As the effect to be given to a foreign judgment is altogether a matter of comity, in cases where it has not been regulated by positive treaty, and no sovereign is bound to execute within his own dominion a sentence given out of it, the rule adopted, where a suit is brought to enforce a foreign judgment, is that the foreign judgment is to be received, in the first instance, as *primâ facie* evidence of the debt, but that the defendant is entitled to impeach the justice of it or to show that it was irregularly and unduly obtained. But the case is different where the losing party comes forward and wishes to institute a new suit upon the same

FOREIGN ENLISTMENT ACT—FOREKNOW.

matter, and to open up a foreign judgment dismissing the action, pronounced by a competent court. In this case, to interfere with the foreign judgment would be to assume the attitude of a court of review; and the rule . . . consequently is that such a decision, when given by a foreign court, is final and conclusive. So obvious, indeed, is the convenience and necessity of this rule, that it has been regarded as forming a portion of general jurisprudence.' —Kent's *Com.* II. 101, 102. As regards the enforcement of foreign decrees and judgments, the usages of nations have differed considerably, and the subject is wide and difficult. For the distinction between the recognition of the judgment of a foreign court, as determining the validity of a foreign contract, and the application of a foreign remedy by the courts of a country. See FOREIGN BILL OF EXCHANGE. The French courts are in the habit of giving effect to judgments obtained in England, and debtors cannot escape from their creditors, as is generally supposed, by simply crossing the Channel. The difficulty still exists where the debtor has escaped before any proceedings could be taken against him in England, and where no judgment can be obtained. The same observations apply to Belgium. (Phillimore, *International Law*, iv. See JURISDICTION; DOMICILE; INTERNATIONAL LAW, PRIVATE: CONFLICT OF LAWS: EDICTAL CITATION: ETC.

FOREIGN ENLISTMENT ACT, in Britain: law providing that if any British subject shall agree to enter the service of any foreign state, either as a soldier or a sailor, without the license of her majesty, or an order in council or royal proclamation, or if any person within the British dominions induces any other person to enlist in the service of a foreign state, such person shall be guilty of a misdemeanor. Masters of vessels, knowingly having such persons on board, are punishable by fine or imprisonment, or both. Persons building any vessel for foreign service, without license, are guilty of a high misdemeanor, and the ship and stores are forfeited. Even to assist a foreign state with warlike stores, without license, is a misdemeanor punishable with fine and imprisonment. These penalties are irrespective of any consequences that may follow to the individual for having committed a breach of international law.

FOREIGN OFFICE, of Great Britain: department of administration, established 1782, in charge of British interests in other countries. Its head is the secretary for Foreign Affairs, who selects diplomatic officials, negotiates treaties, grants passports, etc.

FOREIGN TRADE: see IMPORTS AND EXPORTS: FREE TRADE: TARIFF: BALANCE OF TRADE.

FOREJUDGE, *v.* *för-jǔj'* [*fore*, and *judge*]: to judge before hearing the facts and proofs.

FOREKNOW, *v.* *för-nō'* [*fore*, and *know*]: to know before; to have a previous knowledge of. FOREKNOWLEDGE, *n.* *för-nöl'ëj*, knowledge of a thing before it happens; prescience; in *theology*, see ARMINIUS: CALVINISM: ELEC-

tion, in Theology: PREDESTINATION. FOREKNOWN, pp. *för-nön'*, known beforehand.

FORELAND, n. *för'lünd* [*fore*, and *land*], a cape; a promontory. NORTH FORELAND and SOUTH FORELAND, two promontories on the e. coast of Kent, England; between which are the Downs and Goodwin Sands.—North F., the *Cantium* of Ptolemy, forms the n.e. angle of the county and of Thanet Isle, lat. $51^{\circ} 22'$ n., and long. $1^{\circ} 26'$ e., two m. e. of Margate. It consists of chalky cliffs, nearly 200 ft. high, projecting into the North Sea, and has a light-house with a fixed light, 184 ft. high, visible 24 m. off.—South F., also of chalk-cliffs, is 16 m. s. of North F., 3 m. n.e. of Dover, lat. $51^{\circ} 8'$ n., and $1^{\circ} 22'$ e. It has two fixed lights, respectively 380 and 275 ft. above the sea, visible 25 and 22 m. From this point there is often a magnificent view of 200 to 300 merchantmen passing by, after detention by contrary winds in the Downs.

FORELAY, v. *för-lä'* [*for*, against, and *lay*]: in *OE.*, to lay wait for; to entrap by an ambush; to lay down beforehand. FORELAYING, imp.: N. in *S. Africa*, forming or laying an ambush in front of. FORELAID', pt. pp. *-lād'*.

FORELEND, v. *för-lënd'* [*fore*, and *lend*]: in *OE.*, to give beforehand. FORELENT', pt. pp. *-lënt'*, given beforehand.

FORELIFT, v. *för-lift'* [*fore*, and *lift*]: in *OE.*, to raise aloft an anterior part. FORELIFTING, imp. raising up an anterior part.

FORELOCK, n. *för'lök* [*fore*, and *lock*]: the hair that grows over the forehead. TO TAKE TIME BY THE FORELOCK, not to let slip an opportunity; to make the most of time.

FORELOCK, *för'lök*: flat wedge driven through the end of a bolt to prevent its withdrawal; used principally on board ship.

FOREMAN, n. *för'män* [*fore*, and *man*]: a man set over workmen; the chief man of a jury. FOREMAST, n. *-mäst*, in a *ship*, the mast nearest the forepart. FOREMENTIONED, a. *-mën'shünd*, said or written before.†

FOREMOST, a. *för'möst* [*AS. forma*, first, the superl. of *fore*; *foremost* being thus really a double superlative]: first in place or rank. FORENAMED, a. *-näm'd*, mentioned before.

FORENOON, n. *för'nón* [*fore*, and *noon*]: from the morning to mid-day.

FORENSIC, a. *för-rën'sik* [*L. foren'sis*, belonging to the market or forum—from *forum*, the forum or market-place, where causes were tried and pleaded. It. *forense*]: pertaining to courts of judicature, or to discussions or pleadings in them; used in courts or legal proceedings, as a *forensic* term, a *forensic* speech.

FOREORDAIN, v. *för'ör-dän'* [*fore*, and *ordain*]: to ordain or appoint beforehand, as by God; to predestinate. FOREORDAINING, imp. appointing beforehand. FOREORDAINED', pp. *-dänd'*, appointed beforehand. FOREOR-

FOREPART—FORESHORTEN.

DINA'TION, n. *ör'dĩ-nā'shŭn*, previous ordination or appointment by God; predestination: see ARMINIUS: CALVINISM: ELECTION, in Theology: PREDESTINATION.

FOREPART, n. *för'párt* [*fore*, and *part*]: front or first part.

FOREPAST, a. *för'pást* [*fore*, and *past*]: in *OE.*, by-gone; previous.

FORERANK, n. *för'rängk* [*fore*, and *rank*]: in *OE.*, first rank; front.

FOREREACH, v. *för-rēch'* [*fore*, and *reach*]: in *nav.*, to get before another ship by better sailing.

FORE-RECITED, a. *för-rē-sī'tēd* [*fore*, and *recited*]: mentioned or enumerated before.

FORERUN, v. *för-rŭn'* [*fore*, and *run*]: to precede; to come before. FORERUN'NING, imp. FORERAN', pt. -răn'. FORE'RUNNER, n. -rŭn-nér, a messenger sent before; a harbinger; an ancestor; a prognostic.

FORESAY, v. *för-sā'* [*fore*, and *say*]: to predict; to foretell. FORESAID, a. *för'sēd* [*fore*, and *said*]: spoken of before; described before.

FORESEE, v. *för-sē'* [*fore*, and *see*; Dut. *vorzien*; Sw. *förese*, to foresee]: to see or know an event before it happens. FORESEE'ING, imp. FORESAW', pt. -saw'. FORE-SEEN', pp.

FORESHADOW, v. *för-shād'ō* [*fore*, and *shadow*]: to shadow or typify beforehand; to portend. FORESHAD'OWING, imp.: N. act of shadowing beforehand; anticipation. FORESHAD'OWED, pp. -ōd.

FORESHIP, n. *för'shĭp*: the forepart of a ship.

FORESHORE, n. *för'shōr* [*fore*, and *shore*]: the front shore; the part of the beach or shore stretching between low and high water marks; also applied to parts but recently covered within those limits by water.

FORESHORTEN, v. *för-shört'n* [*fore*, and *shorten*]: to represent figures as they appear when viewed obliquely. FORESHORT'ENING, n. -shört'nĭng, in *painting*, the art of diminishing the entire length of an object when viewed obliquely. FORESHORT'ENED, pp. -shört'nd.—*Foreshortening* is a term in painting or drawing, signifying that a figure, or a portion of a figure, or a construction, intended to be viewed by the spectator direct or nearly in front, is so represented as to convey the notion of its being projected forward; and, though by mere comparative measurement occupying a much smaller space on the surface, yet to give the same idea of length or size as if it had been projected laterally. In compositions of figures and groups on ceilings, and in the interior of domes, etc., numerous examples will be found in which this art has been put in practice; in the works of Raphael, foreshortening is practiced with most judgment and correctness; those of M. Angelo, Correggio, and Tintoretto show greatest boldness; but the three last-named artists have been censured for introducing foreshortening too frequently into their

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compositions, for the purpose of parading their skill in practicing it.

FORESHOW, and **FORESHEW**, v. *för-shō'* [*fore*, and *show*]: to represent or reveal before it happens; to predict; to foretell.

FORESIDE, n. *för'sid* [*fore*, and *side*]: in *OE.*, outside; superficial appearance.

FORESIGHT, n. *för'sīt* [*fore*, and *sight*]: foreknowledge; prescience; provident care of futurity.—**SYN.**: foreseeing; prognostication; providence; prudence; forethought; forecast; premeditation.

FORESIGNIFY, v. *för-sig'nī-fī* [*fore*, and *signify*]: to indicate the nature of beforehand; to typify.

FORESKIN, n. *för'skīn* [*fore*, and *skin*]: the skin that covers the glans penis.

FORESKIRT, n. *för'skīrt* [*fore*, and *skirt*]: in *OE.*, the loose part of the skirt of a coat hanging in front.

FORESPENT, and **FORSPENT**, a. *för-spēnt'* [*for*, intensive, and *spent*]: in *OE.*, spent completely; exhausted; wearied; wasted; forepast; past.

FORESPURRER, n. *för'spēr-ēr* [*fore*, and *spur*]: in *OE.*, one who spurs or rides a horse before.

FOREST, n. *för'ēst* [It. *foresta*; OF. *forest*; F. *forêt*, an uncultivated tract of country—from mid. L. *fores'ta*, an open tract of ground reserved for the chase—from L. *fōris*, out of, not shut: W. *gorest*, waste ground: Gael. *fridh*, an uncultivated open space]: a large tract of land covered with trees; an uncultivated tract of ground interspersed with wood for field-sporting: **ADJ.** sylvan; rustic. **FOR'ESTED**, a. covered with trees; wooded. **FOR'ESTER**, n. one appointed to watch a forest and protect game. **FORESTRY**, n. *för'ēs-trī*, the art of forming forests. **FOREST-TREE**, not a fruit-tree. **FORESTMARBLE**, in *geol.*, a shelly limestone of the oolitic formation.

FORESTALL, v. *för-stawl'* [*fore*, and *stall*: AS. *foresteallan*, to forestall]: to buy goods before they are brought to stall or the market where they are to be sold; to anticipate; to take beforehand. **FORESTAL'LING**, imp. anticipating; hindering (see **ENGROSSING**). **FORESTALLED'**, pp. *-stald'*. **FORESTAL'LER**, n. one who.—**SYN.** of 'forestall': to monopolize; engross; preoccupy; deprive; obstruct; intercept.

FORESTAY, n. *för'stā* [*fore*, and *stay*]: a strong rope in a ship reaching from the foremast-head, and assisting to support the foremast.

FOR'EST FLY (*Hippobosca equina*): insect of the order *Diptera*; named from its frequent occurrence in forests, and particularly in the New Forest, Hampshire, England. It is sometimes called **HORSE FLY**, from the annoyance which it gives to horses. It is a small insect, about four lines long; its wings, two in number, much exceeding the length of the abdomen. When at rest, the wings are laid flat on the back, one overlapping the other. The general color is brown, the thorax varied with pale yellow, the

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legs ringed with yellow and brown. The legs terminate in hooked claws. The skin is leathery and remarkably tough so that the insect cannot be killed by any ordinary amount of squeezing. The structure of the mouth differs much from that of ordinary dipterous insects, and bears considerable resemblance to that of fleas. The F. F. lives by sucking the blood of quadrupeds, sometimes of oxen, dogs, etc., but most of all of horses. High-bred horses with smooth hair are most liable to this annoyance. The female F. F. does not deposit her eggs until they have



Forest Fly (*Hippobosca equina*), magnified.

1, natural size; 2, the pupa, as deposited by the mother.

reached the pupa stage in her abdomen. Only one is produced at a time, inclosed in a tough, strong skin, egg-like, black, and shining like a bead, wonderfully large when the size of the abdomen from which it came is considered; the perfect insect finally emerges by bursting open a kind of lid or cap.

FOREST LAWS, in England: laws for regulation of the royal forests. Forest is defined by Lord Coke to be a safe preserve for wild animals (*feræ*) of the chase, whence the term *foresta*, by the change of *e* into *o* (*Co. Litt.* 233 a). Both words probably spring from the same root as the Latin *foris* and the French *hors*, and signify that which is *without* the range of the peopled or cultivated country. Hence the Italian *forestiere* and *feresto*, and the Spanish *forestero*, signify strange, foreign, wild, and the like. A forest, in the sense of the law of England, is a large tract of open ground, not necessarily covered with wood, but usually containing woodland interspersed with pasture, and forming part of the property of the monarch, and governed by a special code, called the forest law. This particular law had reference not only to matters connected with hunting and the like, but generally governed the persons living within the forest in all their relations. A *chase* is a smaller forest, in the hand of a subject, but not governed by forest law. Though the privilege of forest belongs of right to the sovereign alone, it may be granted by him in favor of a subject, who becomes entitled to exercise the privileges of forest in the district assigned. This right was exercised by the Saxon kings, who reserved large tracts of country for the royal pastime of hunting, and a charter of the forest was said to have been passed by Can-

FOREST LAWS.

ute at Winchester, 1016. But the authenticity of this document is doubted by Lord Coke (*Inst.* iv. 320). William the Conqueror greatly extended the royal forests by laying desert vast districts in Hampshire and Yorkshire; he also introduced penalties of the severest kind for offenses against the game. The penalty for killing a stag or boar was loss of eyes; for William loved the great game as if he had been their father (*Sax. Chronicle*). It was not till the reign of Henry III. that the F. L. were reduced into a regular code. In the reign of that monarch was passed the charter of the forest, 9 Henry III. (A.D. 1224). The right of the sovereign to create a forest is by the common law confined to lands of his own demesne. Henry II. had arbitrarily exercised his power by afforesting the lands of his subjects; but by the 1st and 3d chapters of the charter of the forest, it is provided that all forests so made should be disafforested. At a subsequent time, when Henry VIII. created Hampton Court Forest, he was obliged to obtain the consent of the freeholders before he could erect a chase or forest over their grounds (Coke, *Inst.* iv. 301). Mr. Hallam remarks: 'It is well known that Charles I. made Richmond Park by means of depriving many proprietors not only of their common rights, but of their freehold lands. It is not clear that they were ever compensated; but I think this probable, as the matter excited no great clamor in the Long Parliament.'—Hallam *Const. Hist.* i. 463, note, 1st ed. By the charter of the forest, the penalties for destroying game are greatly modified. By cap. 10, it is provided that no man shall lose life or limb for slaying deer, but that the punishment shall be restricted to fine or imprisonment for year and day. Cap. 11 contains the following curious privilege: 'Whatsoever archbishop, bishop, earl, or baron, coming to us at our commandment, passing by our forest, it shall be lawful for him to take and kill one or two of our deer by view of our forester if he be present; or else he shall cause one to blow an horn for him, that he seem not to steal our deer; and likewise they shall do returning from us.' This law is still unrepealed; so that a bishop may kill the Queen's deer when summoned to, or returning from parliament. Charles I attempted to fill his empty exchequer by imposing penalties and exacting fines for alleged encroachments on the ancient boundaries of the forests, though the right to the lands thus taken was fortified by possession for several centuries. This was one of the first grievances with which the Long Parliament dealt, and since the passing of the act for the 'certainty of forests' (16 Car. I. c. 16), the laws of the forest have practically ceased. In Coke's time, there were 69 royal forests, all of which, with the exception of the New Forest and Hampton Court Forest, had been created before the period of record. Of these, the principal were—the New Forest, Sherwood, Dean, Windsor, Epping, Dartmoor, Wichwood, in Oxfordshire, Salcey, Whittlebury, and Rockingham, in Northamptonshire, Waltham, in Lincolnshire, and Richmond, in Yorkshire. During the present reign, several of the royal forests have been disaf-

FOREST MARBLE—FORESTS.

forested by act of parliament. Public necessity is the plea on which these spots, long famous for sylvan scenery, have been condemned. The plea is one which cannot be altogether disregarded; some of the royal forests, from their vicinity to large towns, afford resorts for public recreation highly prized by the citizens, and which never can be equalled in beauty and healthfulness by any new-made pleasure-ground.

The royal forests of Scotland, in ancient times, seem to have been nearly as numerous as those of England. The forest code of Scotland, though neither so complete nor administered with the same rigor as that of England, was generally complained of for its severe penalties or vexatious restraints. From a case, recently decided, it seems that the high pretensions of royal foresters have in some places survived to the present day. The Dukes of Athole still hold the mountainous district called the forest of Athole, either in their own right or as foresters for the crown. In virtue of his rights of forestry, the sixth duke claimed the power of preventing his neighbor, the Laird of Lude, from killing deer on his own lands, and maintained that he was bound to allow the duke and his keepers to enter on his lands and drive back any deer that might stray upon them from the forest of Athole. But the court decided against the duke on both points. See DEER FORESTS.

Forest Courts were courts four in number, in England, established for the purpose of enforcing the forest laws in the royal forests.

FOREST MARBLE: a member of the Lower Oolite, so called because of the occurrence of the typical beds in Wichwood Forest, Oxfordshire. The principal bed is a fissile limestone, containing large numbers of dark-colored shells, and capable of fine polish. On this account, it is used to some extent as 'marble.' It is interstratified with blue marls and shales, and fine oolitic sandstones. The whole thickness of the group seldom exceeds 40 feet.

FOREST OAK: name sometimes given in commerce to the timber of *Casuarina torulosa*, and other species of *Casuarina* (q.v.), Australian trees. This timber, which is light yellowish brown and prettily marked with short red veins, is exported, and used for ornamental work.

FORESTS: see ARBORICULTURE.

FORESTS, FOSSIL: formations frequent in the coal measures. The seams of coal having in general been formed from the vegetation of the locality where they occur, it is to be expected that when the coal is removed, the stools and roots of the trees would be observed in the immediately subjacent bed of shale—the ancient soil. Such a forest was laid bare in an open work at Parkfield Colliery, near Wolverhampton, England, 1844. In the space of about one-fourth of an acre, the stumps of 73 trees, with their roots attached, appeared as shown in the annexed ground-plan. The trunks, broken off close to the root, were lying prostrate in every direction, often crossing each other. One

of them measured 15, another 30 ft. in length, but they were generally shorter. They had been invariably converted into coal, and flattened to the thickness of 1 or 2 inches. The upright stems show that some of them had a circumference of more than 8 ft. similar F.F. have been observed in the coal-fields of Nova Scotia, and have been carefully described by Lyell, Logan and Dawson. The usual height of the trees observed by Lyell was 6 to 8 ft.; but one tree was about 25 ft. high, and 4 ft.,



Ground-plan of the Fossil Forest at Parkfield Colliery.

in diameter. Brogniart describes the remains of a fossil forest preserved in an upright position, in strata of micaceous sandstone, belonging to the coal measures at St. Etienne, near Lyon, France. Though most abundant in strata of the carboniferous period, F.F. have been observed in other formations. The Dirt-bed (q.v.) of the Lower Purbeck series is the remains of an ancient forest. Instances are abundant in the pliocene strata also. Sometimes, as on the coast of Devonshire and on the shores of the Firth of Tay, they are exposed on the surface, stretching from high-water mark to far below the furthest limit of low-water; or they are exhibited in section, as in the cliffs of Eastern Norfolk, where, resting on the chalk or crag, there is a stratum in which the stools and roots of the trees stand in their natural position, the trunks having been broken short off, and imbedded with their branches and leaves. This stratum is covered with fresh-water beds and drift. The position of these forests indicates a variation, in recent geological time, of the relative level of land and water. The instances in Devonshire and Fifeshire may imply a simple subsidence of the land; at Norwich, however, a considerable depression must have taken place, to admit of the deposition of the fresh-water beds and the till, and a subsequent elevation, to expose the beds so high above the sea-level.—The remains of ancient forests, belonging to a later period are to be found in beds of peat. There is good evidence that some kinds of peat had their origin in the destruction of forests. Trunks and branches of beech, hazel, fir, etc., are found in them, and their roots may be traced in the underclay. The rapidity with which this peat is formed is very remarkable. At Blair-Drummond, the stratum of peat is eight to ten, and in some places even twenty ft. in thickness. Many of the trees here have been felled with the axe, and that this was done while the Romans were in possession of the country, is proved by the discovery of 'corduroy roads,' leading from one camp to another, and the finding of camp-kettles at the bottom of the peat.

FORESWART, a. *för'swart*, or **FORE'SWAT**, a. *-swät* [*for*, intensive; *swart*, of a dark hue, tawny: *swat*, imperf. of *sweat*]: spent by sweating or heat; overwearied.

FORETASTE, n. *för'täst* [*fore*, and *taste*]: a taste before-

FORETELL—FORFARSHIRE.

hand; anticipation. FORETASTE, *v. fôr-tâst'*, to taste before full possession; to have previous enjoyment or experience of something. FORETAST'ING, *imp.* FORETAST'ED, *pp.*

FORETELL, *v. fôr-têl'* [*fore*, and *tell*]: to tell before an event happens; to predict. FORETEL'ING, *imp.* FORETOLD, *pt. -tôld'*, did foretell. FORETOLD', *pp.* told before; predicted.—*SYN.* of 'foretell': to prophesy; prognosticate; augur; foretoken; foreshow.

FORETHOUGHT, *n. fôr'thawt* [*fore*, and *thought*]: anticipation; foresight; provident care.

FORETOKEN, *v. fôr-tôkn* [*fore*, and *token*]: to foreshow; to presignify: *N.* a previous sign or omen. FORETO'KENING, *imp. -tôkn-ing.* FORETO'KENED, *pp. -tô'kend*, foreshown.

FORETOOTH, *n. fôr'tóth* [*fore*, and *tooth*]: a tooth in the forepart of the mouth.

FORETOPMAST, *n. fôr-tôp'măst* [*foretop*, and *mast*]: the mast erected on the head of the foremast.

FOREVER, *ad. fôr-êv'êr* [*for*, and *ever*]: always; ceaselessly; endlessly.—*SYN.*: continually; incessantly; eternally; everlastingly; constantly; invariably; unchangeably; perpetually; unceasingly; interminably.

FOREWARN, *v. fôr-wawrn'* [*fore*, and *warn*]: to admonish beforehand; to give previous notice to; to caution. FOREWARN'ING, *imp.*: *N.* a caution or admonition beforehand. FOREWARNED', *pp. -wawrnd'*.

FOREWOMAN, *n. fôr'wôm-ăn* [*fore*, and *woman*]: the chief woman in a workshop; female manager.

FOR'FANG, or FORE'FANG [*Sax. fore*, before, and *fangen*, to take]: in England formerly, taking of provision from any one in fairs or markets, before the king's purveyors were served with necessaries for his majesty. *F.* is used to signify also the rescuing of stolen or strayed cattle from a thief, or from those having illegal possession of them; or the reward fixed for such rescue (*Wharton's Dic.*).

FORFAR, *fawr'fêr*, supposed ancient *Orrea*: county town of Angus or Forfarshire, Scotland, near a small lake of the same name, on a rising ground in the fertile valley of Strathmore. It has been a royal burgh since the reign of King David I. (1124–53). It had a royal castle, of which no vestige remains, said to have been on a round hill, on the n. side of the town, and to have been destroyed by order of King Robert Bruce 1307. Its staple manufacture is linen. It is connected by railway with Aberdeen, Arbroath, and the south. Pop. (1871) 11,031; (1891) 12,844.

FORFARSHIRE, *fawr'fêr-shêr*, or ANGUS, *ăn'gûs*: maritime county in the e. of Scotland, bounded on the e. by the German Ocean, on the n. by Kincardine and Aberdeen shires, on the w. by Perthshire, on the s. by the Firth of Tay. It extends n. to s. 38 m., and e. to w. 27 m., with 45 m. of coast. There are several valleys of considerable extent, the principal of which are Glen Isla, Glen Prosen, Glen Esk, Clova, and Lethnot, all well watered, and

mostly productive. The surface of the county is irregular, and it is intersected with hills, the Sidlaw being 1,400 ft. high, and Catlaw, the highest, 2,264 ft. The soil, which is various, ranging from the finest alluvial to the moorish, rests mostly on old red sandstone and trap. Devonian paving-stones, limestone, porphyry, and jasper, occur. The chief rivers are the Tay, North Esk, South Esk, and Isla; and there are some small lochs. F. is the chief seat of the Scotch linen manufacture. Cattle, corn, salmon, and paving-stone are the principal exports. The climate is that common to the e. coast. The average of the fall of rain is about 25 inches. The valued rent of the county 1674 was £171,440 Scots, or £14,287 sterling. The valuation for 1880-1 was £639,282 sterling, including £53,066 of railways. In 1881, according to the agricultural returns of Great Britain, the total acreage in the county of all kinds of crops, bare fallow, and grass, was 253,303; under corn crops, there were 94,104 acres; under green crops, 53,813; and of clover, sanfoin, and grasses under rotation there were 80,338. The total number of cattle returned for 1881 was 45,835; sheep, 119,386; pigs, 4,964. The number of horses used solely for agriculture, etc., returned by occupiers of land in the same year, was 10,358. The chief towns are Dundee, Arbroath, Montrose, Forfar (the county town), Brechin, and Kirriemuir. The county returns one member to parliament, and the boroughs three. Angus was the province of a *Mormaer* during the Celtic period of Scottish history. It appears as an earldom in the 12th c. Its first earls were probably the descendants of the old *Mormaers*; it passed subsequently to the Umphravilles, the Stewarts, and the Douglasses. The castle of Forfar was the residence occasionally of some of the kings, until the time of Alexander III. The chief antiquities are some Roman camps, the vitrified fort of Finhaven, the remarkable stone forts of the White Caterthun, near Brechin, and of the Laws, near Dundee; the sculptured stone pillars at Meigle, Aberlemno, St. Vigean's, Glamis, Kirriemuir, Aldbar, Invergowrie, etc.; the fortified island of St. Margaret's Inch in the Loch of Forfar, the round tower and cathedral of Brechin, the ruins of Restennet Priory and Arbroath Abbey; and the old baronial castles of Glamis, Red Castle, Edzell, Melgund, Finhaven, Airlie, Careston, Inverquhar. At Stracathro, it is said Baliol resigned the crown to Edward I. Several eminent men were born in this county—Hector Boece, Andrew Melville, the Marquis of Montrose, Joseph Hume, Sir Alexander Burnes, Robert Brown the botanist, James Mill the historian of British India. Pop. (1881) 266,360; (1901) 284,082.

FORFEIT, n. *för'fit* [F. *forfait*, a crime—from *forfaire*, to misdo, to transgress: mid. L. *foris-factus*, one who has misdone himself—from *foris*, without; *factus*, done]: a fine; a penalty; that which is lost or alienated for a crime, fault, or neglect; in *OE.*, one rendered liable to punishment or penalty, especially capital punishment: V. to lose by neglecting or refusing to fulfil the conditions of a contract or bargain; to lose by some fault, crime, or offense: ADJ. forfeited. FOR'-

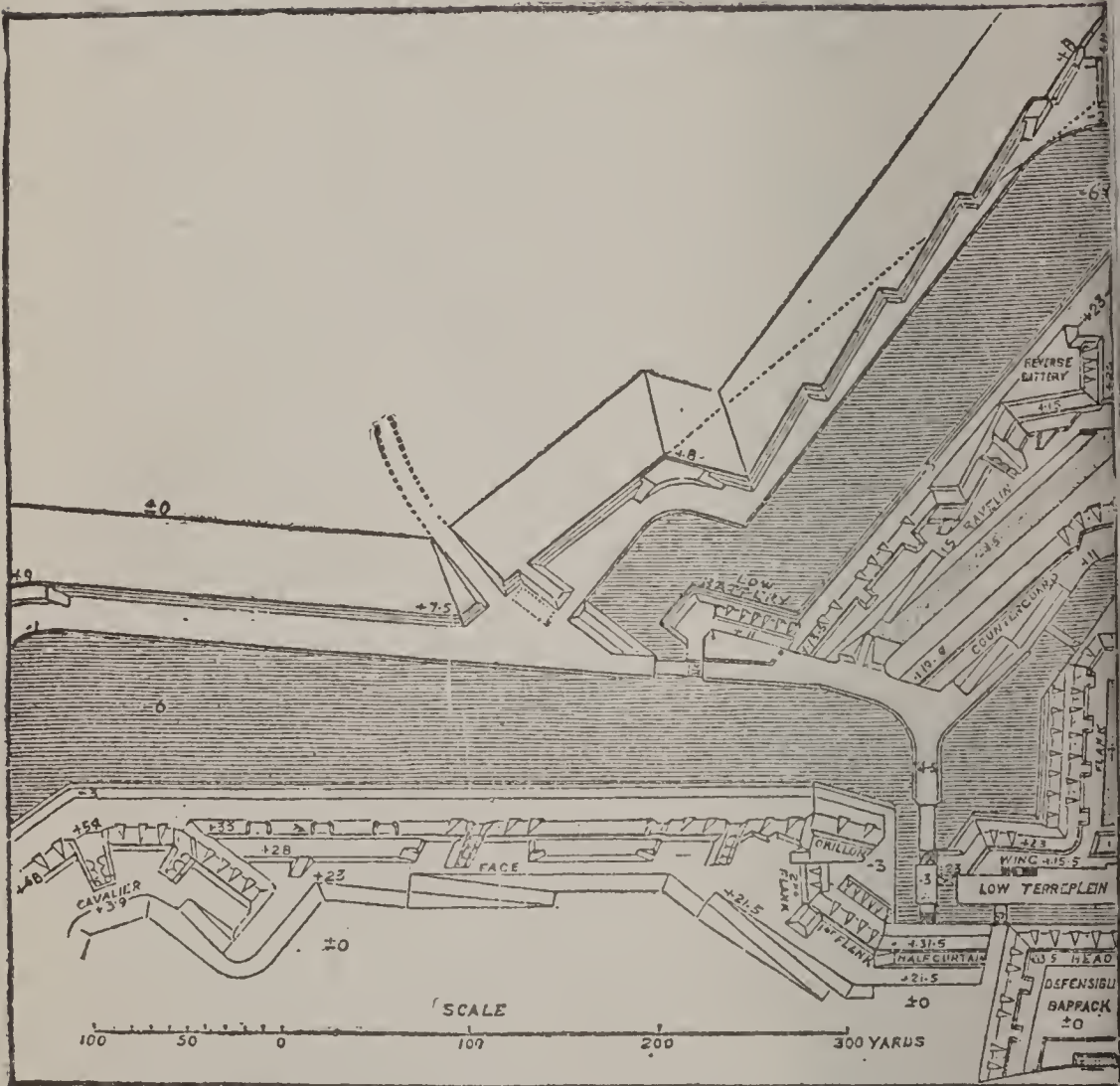
FORFEITURE OF LANDS.

FEITING, imp. **FORFEITED**, pp.: **ADJ.** lost or alienated by an offense or crime, or by a break of condition. **FORFEITS**, n. plu. in *sport*, things deposited, to be redeemed by a merry fine; in *OE.*, table of penalties. **FORFEITABLE**, a. *-ā-bl*, liable to be forfeited. **FORFEITER**, n. one who forfeits a thing. **FORFEITURE**, n. *-ūr*, the losing of some right, privilege, estate, honor, or office, etc., by some offense, crime, or neglect; that which is forfeited.—**SYN.** of 'forfeiture', fine; mulct; penalty; amercement; forfeit.

FORFEITURE AND CORRUPTION OF BLOOD penalties in the law of Great Britain consequent on convictions for treason or felony. The penalty of forfeiture for treason is founded on this consideration, that he who hath thus violated the first principles of government, and broken his part in the original contract between king and people, hath abandoned his connection with society, and hath no longer any right to those advantages which before belonged to him purely as a member of the community (*Stephen's Com.* iv. 497). The penalty of forfeiture for treason prevailed in England before the Conquest, as is clear from the fact, that lands held in gavelkind, which is a Saxon tenure, may be forfeited for treason. But after the Conquest, forfeiture of lands and goods came to be regarded as the peculiar punishment of felony, of which treason against the sovereign was the highest kind, and was denominated high treason, to distinguish it from all other felonies, which were called petty treason. In cases of treason, the offender forfeits all his lands absolutely to the crown. As the law now stands, in all felonies, the goods and chattles of the offender are, on conviction, forfeited to the crown; but until conviction, forfeiture of the goods does not operate. Where, therefore, a person has disposed of his goods before conviction, the crown cannot reach them. Forfeiture of lands does not take effect until sentence of attainder (q. v.) has been pronounced. Since the Union, the law of Scotland in regard to forfeiture for treason has been assimilated to that of England.

In America, forfeiture of estate for crimes has never existed, except in certain rare instances. But there are laws for forfeiture of property actually used in the commission of certain crimes; e. g., vessels used in piracy or slave trade, goods, smuggled or imported under fraudulent invoices. Acts of attainder (q. v.) are forbidden by the constitution. Some states have laws similar to that of N. Y., which provides that every person convicted of any manner of treason, forfeits his goods and chattels, and also his lands and tenements, during his lifetime; but the rights of all third persons existing at the time of the commission of the treason, are preserved, *Kent's Commentaries*, ii. 505.

FORFEITURE OF LANDS: in England, originally a penalty of the feudal law, incurred on account of some act by the tenant inferring disloyalty to his overlord. The acts inferring forfeiture might be of either a civil or a criminal nature. Forfeiture of crimes was incurred by treason or felony: see **FORFEITURE AND CORRUPTION OF**



Fortification.—Fig. 3. Half-front of the Enceinte of Antwerp.

FORFEND—FORGE.

BLOOD. Civil forfeiture may be incurred in England in three ways—viz., by tortious alienation, by wrongful disclaimer, and by alienation in mortmain; the first two of these modes were incidents of the feudal tenure, the latter was introduced by statute. Tortious alienation was where the owner of a particular estate conveyed by common law conveyance, as feoffment, fine, or recovery, a greater estate than that to which he was himself entitled, as where a tenant-for-life made a feoffment in fee; this forfeiture has ceased to have practical importance. Forfeiture by wrongful disclaimer was where a tenant holding under a superior lord, on being summoned in any court of record, in any wise disclaims his allegiance: this forfeiture can now arise only in lands held of the crown. Forfeiture by alienation in mortmain is incurred by the conveyance of lands and tenements in favor of any corporation (q. v.), sole or aggregate, ecclesiastical or temporal: this act by a vassal was held prejudicial to the rights of the overlord: see **MORTMAIN**. Forfeiture of copyholds was incurred by committing waste, and by other acts inconsistent with the fealty due to the lord: see Blackstone, *Com.* ii. 284. Forfeiture on breach of condition, subsequent is where an estate is held upon a condition contained in the grant itself, which condition fails.

In Scotland, civil forfeiture may arise either from statutory enactment, at common law, or by agreement. Forfeiture on special agreement depends wholly upon the terms of the condition inserted in the titles to the land. Of this kind of forfeiture are breaches of entails (q. v.).

FORFEND, v. *för-fëndā'* [*for*, and *fend*, the familiar abbreviation of *defend*: F. *defendre*, to forbid (see **FOREFEND**)]: to hinder; to avert.

FORFEX, n. *fawr'fěks* [L.]: pair of scissors.

FORFICULA, n. *fawr-f'ik'ū-la* [L. pair of small shears or scissors]: typical genus of *Forficulidæ*, a family of insects, the only known one belonging to the order *Euplexoptera*, or *Dermaptera*.

FORGAT, v. *för-găt'*: an old pt. of *forget*; forgot.

FORGAVE: pt. of **FORGIVE**, which see.

FORGE, v. *förj* [F. *forge*; It. *forgia*, a smithy—from L. *fabrica*, a workshop—from L. *faber*, a smith]: to shape a piece of metal by heating and hammering; to make or contrive, in a disparaging sense; to make falsely; to falsify; to counterfeit: N. a place where iron or any other metal is heated and beaten into shape; a smithy. **FOR'ING**, imp. hammering red-hot iron, etc (see below). **FORGED**, pp. *förjd*. **FOR'GER**, n. *-jër*, one who falsifies; a fabricator. **FOR'GERY**, n. *-jër-ĭ*, the crime of making or altering checks, stamps, bank-notes, or writings, in order to make them pass as genuine; that which is forged (see below). To **FORGE ON**, to make its way slowly and laboriously, as a ship. **FORGETIVE**, a. *för'jët-iv*, in *OE.*, inventive; productive.—**SYN.** of 'forge, v.': to fabricate; feign; frame; produce; effect.

FORGERY—FORGET.

FORG'ERY: the *crimen falsi* of the Roman law; at common law, the fraudulent making or altering of a writing or seal, to the damage of another man's right, or of a stamp to the damage of the revenue. As regards writings, the instrument forged must be executed with such skill or in such circumstances as to be capable of being mistaken for a genuine document by a person of ordinary intelligence and observation. It is not necessary that there should be even an attempt at imitation. If there was intention to deceive, and the circumstances were such as to render deception possible, the crime has been committed, and it has consequently been held in Scotland that it is possible to forge the name of a person who cannot write (1 Alison, p. 372), and further that the crime may be committed by the adhibition of a cross or mark (Macmillan, 1859, Jan. 24). Any material alteration, however slight, is a forgery just as much as the subscription of the name of the pretended maker, or the fabrication of the entire deed. It will not lessen the crime, though the whole deed should be genuine, the name only being forged, or the name being really the handwriting of the party to whom it belongs, but appended to a forged deed. Even if the name be a fictitious one, but appended for the purpose of deceiving, a forgery has been committed just as much as if it belonged to a real person. Long before the recent extensions took place in the law of evidence, by which parties were admitted as witnesses in their own causes, it was provided in England, that the party whose name had been forged might be a witness to the effect that the writing was not his. But, on the other hand, it is an established rule of law that the proof of forgery, by a mere comparison of handwriting, is incompetent (Tailor on *Evidence*, p. 1428, n. 5, 2d ed.). Identification of handwriting is, if possible, more difficult than identification of the person, which so often forms the chief difficulty in criminal trials. 'As illness, strange dress, unusual attitude, and the like, cause mistakes in identifying the individual, so a bad pen, or rough paper, a shaking hand, hurry, and many other things, change the appearance of a person's handwriting.'—Dickson on *Evidence*, p. 474. There are besides resemblances in handwritings proceeding from many accidental causes, so that much caution is necessary in weighing this kind of evidence. Though writing-masters, engravers, bankers' clerks, and other experts are often adduced as witnesses in trials for forgery, their evidence is really of little value, and generally so conflicting that it can be produced with equal effect on either side. The best witness is one who has often seen the party write, through whose hands his writing has been continually passing, and whose opinion is not the result of an inspection made on a particular occasion for a special purpose. As to obtaining property by false pretenses, see FRAUD.

FORGET, v. *för-gět'* [AS. *forgitan*: *for*, and *get*]: to let go or lose from the memory; to slight; to neglect. **FORGETTING**, imp. **FORGOT'**, pt. did forget. **FORGOT'TEN**, pp. -*göt'n*, escaped the memory; neglected. **FORGET'TER**, n. one who. **FORGET-ME-NOT**, a keepsake. **FORGET'FUL**, a.

FORGET-ME-NOT—FORGING.

-fûl, inattentive; negligent; apt to forget. **FORGETFULLY**, ad. *-lî*. **FORGETFULNESS**, n. aptness to forget; loss of remembrance; neglect; obliviousness.

FORGET-ME-NOT, or **SCORPION GRASS** (*Myosotis*): genus of annual or biennial herbaceous plants, of the nat. ord. *Boraginæ*, with 5-cleft calyx and salver-shaped corolla; the flowers small, and generally blue. The genus is diffused over the temperate zone in all quarters of the world, growing often in ditches and damp meadows—as *Myosotis palustris*, with crooked creeping perennial roots—an angular stem of a foot in height, and calyx covered with appressed bristles. *M. sylvatica*, with calyx covered with stiff spreading hairs, grows in bushy places and woods, and often planted in flower-gardens. The dark blue F. of the Azores (*M. Azorica*) has of late begun to be cultivated in Europe, but requires the green-house. The genus is a favorite with most persons, both because of the brilliancy of the flowers, and because it is generally regarded as the emblem of friendship. The English name Scorpion Grass is now seldom heard. The German name *Vergissmeinnicht* corresponds with the English *Forget-me-not*.—*M. versicolor*, often a weed in gardens, is remarkable for the change of color in the flowers, which are first yellow, then blue. They are very small.—*M. alpestris*, found on some of the mountains of Scotland, is especially admired for the size and brilliancy of its flowers.—The name F. is sometimes given erroneously to the Veronicas, also producing blue flowers.

FORGING: process of hammering red-hot iron or steel into any required shape: the workshop in which the operation is performed is called a Forge. The principal tools of a common smith's forge are the forge-fire or hearth, with its bellows, the anvil, and the various hammers, swages, etc. For large work, an air-furnace, blown by steam-bellows, supplies the place of the simple hearth of the blacksmith, powerful cranes swing the work to its place on the anvil, and a steam-hammer (see **HAMMER**) strikes the blows that squeeze the red-hot mass into shape. Besides these, there are portable forges of various sizes and forms, for military and other purposes. They consists usually of an iron frame, to which a bellows, worked by the foot, is attached; and above the bellows is an iron tray, with a hearth, etc., upon which the fire is made; and the anvil is either attached to this frame, or has a separate stand.

For the general method of forging small work, see **CUTLERY**. For the largest work to which hand-hammers are still applied, such as anchor-F., two gangs of from six to twelve hammermen are employed; they swing the large hammers with such wonderful precision and regularity, that the instant one hammer is withdrawn, another falls upon the same place. A foreman, with a wand, directs the hammering. The two gangs relieve each other alternately, on account of the great severity of the labor. Shovels, spades, mattocks, and many other tools and implements, are partly forged under the tilt-hammer. See **IRON**.

In all processes of F., it is of primary importance to ob-

FORGIVE—FORISFAMILIATE.

tain the greatest possible rapidity in the succession of the blows. There is a double reason for this; first, and simply, that the work is cooling, and the more slowly it is forged, the more frequently it must be re-heated; and secondly, that percussion generates actual heat, and if the blows are sufficiently heavy and rapid, the temperature of the work may be fully maintained out of the fire for a considerable time. The hammer used for tilting steel not only maintains the heat of the bar, but raises it from a dull to a bright red heat.

FORGIVE, v. *för-giv'* [*for*, and *give*: AS. *forgifan*]: to pardon; to overlook or remit, as an offense or debt. FORGIVING, imp.: ADJ. inclined to overlook offenses; merciful. FORGAVE', pt. *-gāv'*, did forgive. FORGIV'EN, pp. *-giv n*, pardoned; remitted. FORGIVENESS, n. *-nēs*, pardon; remission.

FORIO, *fō'rē-ō*: thriving town of Italy, picturesquely situated on the w. coast of the island of Ischia, which stands at the northern side of the mouth of the Bay of Naples. The central portion of the town consists of very narrow streets, but the suburbs are composed of charming white cottages. It has three highly decorated churches, a good harbor, and some trade with Leghorn, Naples, and Genoa. Pop. 3,000.

FORISFAMILIATE, v. *för'is-fä-mil'i-āt* [L. *foris*, out of doors; *familiā*, a family]: to portion off a son with land in the lifetime of his father; to give up a legal title to any further share of paternal inheritance; to free from paternal authority. FORISFAMILIATING, imp. FORISFAMILIATED, pp. FORISFAMILIA'TION, n. *-shūn*, the separation of a child from the family of his father. A child is said to be forisfamiliarated, either when he marries, or when he receives from his father a separate stock, the profits of which are enjoyed by himself, though he may still reside with his father, or when he goes to live in another family with the consent of his father. The same result is brought about when a child renounces his *legitim*, i.e., his legal share of the father's free movable property due to him on the death of the latter.

FORK—FORKS.

FORK, n. *fōrk* [AS. *forc*; L. *furca*; W. *fforch*; Icel. *forkr*; F. *fourche*, a fork]: an instrument having two or more prongs; anything like a fork; a point; the space formed at the angle where a road, a river, the bough of a tree, or the like, separates into two continuous lines or branches; in *OE.*, barb of an arrow: V. to raise or work with a fork; to shoot or divide into blades or branches. **FORKING**, imp. **FORKED**, pp. *fōrkt*: **ADJ.** opening or splitting like a fork into two or more parts; zigzag, as lightning. **FORKY**, a. *fōrk'ī*, opening like the prongs of a fork. **FORK'LESS**, a. without a fork. **FORK'TAIL**, a salmon in its fourth year. **FORKEDLY**, ad. *-lī*. **FORK'EDNESS**, n. **FORK'HEAD**, n. in *OE.*, the point of an arrow. **TO FORK OUT**, in *slang*, to hand over or pay down money. **FORKS**, n. plu. in *OE.*, the gallows.

FORKS: table instruments. They have been in use only about three centuries. The Greeks, Romans, and other ancient nations knew nothing of them. They had large F. for hay, and iron F. for taking meat out of pots, but no table-forks. In ancient times, as still in the East, meat was commonly prepared as stews; or, if roasted, it was cut into small pieces by a carver, so as to be easily taken in mouthfuls by the guests, who used their fingers and a knife for the purpose. It certainly is a strange fact, that the use of any species of F. at table was quite unknown till the 15th c., and they were then known only in Italy, which has the merit of this invention. None of the sovereigns of England had F. till after the reign of Henry VIII.; all, high and low, used their fingers. It was accordingly a part of the etiquette of the table to employ the fingers so delicately as not to dirty the hand to any serious degree; but as even by the best management the fingers were less or more soiled it was the custom to wash the hands immediately on the dishes being removed from the table. Hence, in the royal household, there was a dignitary called the *Ewrar* or *Ewary*, who with a set of subordinates attended at meals with basins, water, and towels. The office of ewary survived after F. came partially into use. We learn that when James I. entertained the Spanish ambassador at dinner, very shortly after his accession, 'their majesties washed their hands with water from the same ewer the towels being presented to the king by the lord treasurer, and to the queen by the lord high admiral.' The Prince of Wales had a ewer to himself, which was after him used by the ambassador.—Ellis's *Letters*. The first royal personage in England who is known to have had a fork was Queen Elizabeth; but though several were presented to her, it remains doubtful whether she used them on ordinary occasions. From the inventory of her majesty's appointments in Nichols's *Progresses*, it appears that these forks were more for ornament than use. *Item*, a knife and a spoune, and a forke of christall, garnished with golde sleightly, and sparcks of garnetts: given by the Countess of Lyncolne. *Item*, a forke of corall, slightly garnished with golde: given by Mrs. Frances Drury. *Item*, one spoune and forke of golde; the forke garnished

FORLI.

with two lyttle rubyes, two lyttle perles pendant, and a lyttle coral: given by the Countess of Warwicke.' These ornamental forks had doubtless been presented to the queen as foreign curiosities of some value, and were probably never used at table. As yet, and for a considerable time afterward, forks were not in common use, a circumstance less attributable to ignorance of the invention, than to prejudice. So far was this prejudice carried, by even educated persons, that one divine preached against the use of forks, as being an insult to Providence not to touch one's meat with one's fingers!

This useful invention is explicitly ascribed to Italy in an account of a tour in that country 1608, by a traveller named Thomas Coryate, and whose travels, styled *Crudities*, were published 1611, republished 1776. In these *Crudities* appear the following passages respecting the Italian towns: 'I observed a custom in all those Italian cities and townes through which I passed, that is not used in any other country that I saw in my travels; neither do I think that any other nation of Christendom doth use it, but only Italy. The Italian and also most strangers do always at their meals use a little forke when they cut their meat.' The Italian use of the fork, seems by this account to have then been, not to convey food to the mouth, but to aid in taking a piece of meat from the common dish, and to prevent touching with the hands the meat in that dish.

Forks came so slowly into use in England, that they were employed only by the higher classes at the middle of the 17th c. About the period of the revolution, few noblemen had more than a dozen forks of silver, with a few of iron or steel. At length, for general use, steel forks became an article of manufacture at Sheffield: at first, they had but two prongs, and it was only in later times that the three-pronged kind were made. As late as the early part of the 18th c., table-forks, and we may add knives, were kept on so meagre a scale by country inns in Scotland (perhaps, also in some parts of England), that it was customary for gentlemen in travelling to carry with them a portable knife and fork in a shagreen case; and till this day a small knife and fork form part of the ornamental equipment in the Highland dress. The general introduction of silver forks into Great Britain is quite recent; it can be dated no further back than the opening of the continent to English tourists at the termination of the French war in 1814.

FORLI, *för-lé'*: province of central Italy, in Emilia, bounded by the Adriatic Sea, the provinces of Pesaroed Urbino, Florence, and Ravenna, and the republic of San Marino; 716 sq. m. It comprises the districts of Cesena, F., and Rimini, has a low and unhealthful but productive coast-region, is traversed by portions of the Apennine Mountains, has considerable manufactures, and was formerly a part of the pope's dominion. Cap. Forli; pop. (1872) 233,969; (1891) 269,374; (1901) 280,823.

FORLI; interesting city of Italy, cap. of the province

FORLIE—FORM.

of F.; beautifully situated at the foot of the Apennines, in a fertile plain, on the right bank of the Montone, 16 m. s.w. of Ravenna. It is a well-built, handsome city, surrounded with walls, and contains many striking specimens of architecture, of which the Guerini Palazzo, built after the designs of Michael Angelo, the Palazzo Comunale, the Monte di Pietà, the cathedral, a majestic building, and the churches of S. Philipo Neri, of S. Girolamo, and of S. Mercuriale, are most notable. The ecclesiastical buildings of F. contain some of the best pictures of Cignani, Carlo Maratti, Guido, and other masters. The citadel, founded 1361, is now used as a prison. The inhabitants carry on silk-spinning and salt-refining, with considerable trade in grain, linen, hemp, carthamus, wood, etc. F. (anc. *Forum livii*) is said to have been founded by Marcus Livius Salinator, after his victory over Hasdrubal, on the Metaurus, B.C. 207, and to have received its name from him. In the middle ages, it formed a republic, and changed its rulers frequently during the struggles of the Guelphs and Ghibellines. In 1860, F. formerly in the States of the Church, became Italian. Pop. (1891) 44,000; (1901) 43,708.

FORLIE, v. *för-lī'* [*for*, and *lie*]: in *OE.*, to overlie. **FORLAY**, pt. *för-lā'*, overlay.

FORLORN, a. *för-lawrn'* [*AS. forleoran*, to lose, to let go: Ger. *verloren*, lost: Dut. *verliesen*, to lose: Goth. *fralusnan*, forlorn]: destitute; forsaken; solitary; in *OE.*, taken away; small; despicable: N. a forsaken or solitary one. **FORLORN'LY**, ad. *-lī*. **FORLORN'NESS**, n. **FORLORE'**, a. the old spelling of *forlorn*.—**SYN.** of 'forlorn': friendless; abject; wretched; pitiable; miserable; lost; abandoned; helpless; hopeless; deserted; despicable.

FORLORN-HOPE, n. *för-lawrn'hōp* [Dut. *verloren-hoop*, lost troop—from Dut. or Ger. *verloren*, lost; Dut. *hoop* (pronounced *hope*), band, troop]: a desperate case; a body of soldiers who volunteer or are selected to attempt a breach, or to lead in scaling the wall of a fortress. The French term is *enfants perdus*. There is ordinarily no lack of volunteers for this dangerous but honorable service.

FORM, n. *fawrm* [*F. forme*, fashion, a long bench—from L. *forma*; It. *forma*, shape, figure: comp. Gael. *fuirm*, manner, fashion; *furm*, a stool]: the shape or external appearance of anything; a pattern; a mold; beauty; stated method; ceremony; manner; fashion; ritual; something not essential; a long seat used in a school; name applied to one of the classes of a great public school, as *first form*, *sixth form*, etc.; types set up ready for printing; the bed or seat of a hare. In *music*, distinctive outline, also rhythmical structure; related to harmony as, in drawing, outline is related to light, shade, and coloring. In *philosophy*, since the time of Plato, the reality of a thing which continues under all changes of appearances: the usual term now is *Idea* (q.v.): V. to shape; to fashion; to mold; to contrive; to combine; to arrange; to make; to constitute; to go to make up. **FORMING**, imp. *för'ming*. **FORMED**, pp. *fawrmd*. **FORMER**, n. *för'mēr*, one who.

FORMAMIDE—FORMERET.

FORMLESS, a. *fawrm'lē's*, without form. **FORMAL**, a. *fōr'māl* [F. *formel*—from L. *formālis*]: strictly ceremonious; done in due form; according to regular method; having the form or appearance without the substance or essence; having its proper character; regular; proper. **FOR'MALLY**, ad. *-lī*, in a strict ceremonial manner; stiffly; precisely; essentially. **FORMALITY**, n. *fōr-māl ī-tī* [F. *formalité*]: ceremony; strict observance of social customs; conformity to customary modes; mode or method. **FORMALISM**, n. *fōr'māl-līz-m*, the form without the substance or essence; dependence on external forms only, as in religion. **FOR'MALIST**, n. one who regards appearances only; a stickler for forms; a hypocrite. **FORMATION**, n. *fōr-mā shūn* [F.—L. *formātiōnēm*, formation; *formātus*, formed]: the act or manner of forming; generation or production; in *geol.*, an assemblage of rocks, nearly of the same age, which have some characters, as of age, origin, or composition, common; e.g. the coal or chalk formation. **FOR'MATIVE**, a. *-māl-tīv*, giving form; plastic; N. a word formed from another. **IN GOOD OR BAD FORM**, among *sporting men*, the good or bad condition of a man or horse. **IN BAD FORM**, in bad taste or manners. **IN DUE FORM**, with the proper amount of conventional ceremony.—**SYN.** of 'form, n.': figure; shape; conformation; fashion; structure; configuration; frame; constitution; arrangement; organization; system; way; method; scheme; formula, show; conventionality; formality; shapeliness; elegance; phantom; model; bench; class;—of 'formal': precise; punctilious; stiff; affected; external; outward; starched; ceremonial; ritualistic; regular; methodical; perfunctory.

FORMAMIDE, n. *fawrm'ā-mīd* [*formate*, and *ammonia*]: a compound intermediate between ammonium formate, and hydrocyanic acid.

FORMA PAU'PERIS: legal phrase to signify the arrangements by which an action may be carried on by one who is too poor to sue in the ordinary way. In the event of success, a person suing in this form is entitled to his costs; because his counsel and agent, and the officers of court, though bound to give their labor gratis to him, are not bound to give it on the same terms to his antagonist, unless he too be a pauper. There are some exceptions to this rule (see Stephen's *Com.* III. 646). For some Scotch arrangements see **POOR'S ROLL**.

FORMEDON: old form of action, in the law of England, whereby an heir of entail or remainder man who had been ousted by a discontinuance, was entitled to vindicate his claim to the lands from which he had been ousted: it, with other real actions, is now abolished.

FORMER, a. *fōr'mēr* [AS. *forma*, early, former; compar. of **FORE** (see **FORE**, **FOREMOST**)]: before another or something else in time or order; mentioned before another; past; ancient; in *OE.*, fore; front; first; opposed to *latter*. **FOR'MERLY**, ad. *-lī*, in times past.—**SYN.** of 'former': preceding; previous; prior; foregoing; antecedent; anterior; earlier; first.

FORMERET, n. *fawr-mēr-ēt'* [F.]: in *arch.*, the arch

rib, which, in Gothic gining, lies next the wall, and is consequently less than the other ribs which divide the vaulting.

FORMES, *for'mēs*, CHARLES JOHN (popular name KARL F.): 1810, Aug. 7—1889, Dec. 16; b. Mühlheim: singer. He was educated in Vienna and Cologne and began his musical career as a choir singer. In 1841, while singing in a concert in Cologne, his remarkably deep bass voice attracted the attention of the critics, by whom he was urged to study for the operatic stage. Their advice was taken, and he joined the company at the Mannheim Theatre 1843, and the Vienna opera company 1844. Subsequently he appeared in opera in Hamburg, sang in German opera in London 1849, in Italian at Covent Garden and at the London Philharmonic concerts 1850, and began an American tour at the New York Acad. of Music 1857. He has since resided in the United States. His most popular representations were in *Robert le Diable*, *Don Giovanni*, *The Huguenots*, the oratorios of Handel, Haydn, and Mendelssohn, and the dramatic songs of Franz, Schubert, and other German composers.

FORMIA, *för'mē-ā* (formerly MOLA GAETA, or CASTEL-MOLA): town of Italy, province of Caserta, $3\frac{1}{2}$ m. n.e. of Gaeta, on the Appian Way and the Gulf of Gaeta, occupies the site of the ancient Formiæ, said to have been founded by the Tyrrhenians. F. has always been famous for its beautiful situation and the magnificence of its residences. It was a favorite resort of the old Roman aristocracy, and at one time the villa Caposele was an official residence of the Kings of Naples. Cicero, Augustus, Tiberius, Faustina, and other celebrities of the period had villas in F.; Cicero is said to have been murdered there; and ruins of his bath and tomb are pointed out. Pop. about 9,151.

FORMIC, a. *för'mik* [L. *formicā*, an ant]: pertaining to ants. FORMICA: see ANT. FORMICANT, a. *-mīk-ānt.*, in *pathol.*, term applied to the pulse when extremely small, scarcely perceptible, unequal, and communicating a sensation like that of the motion of an ant felt through a thin texture. FORMICATE, a. *för'mī-kāt.*, ant-like. FORMICA'TION, n. *-kā'shūn*, a sensation resembling that caused by ants creeping on the skin; somewhat resembling the awaking from numbness; in some cases a symptom of spinal or cerebral disease. FORMIATE, n. *för'mī-āt*, or FORMATE, n. *for'māt*, a salt of formic acid. FORMICARY, n. *för'mī-kār-ī*, an ant-hill; the interior economy of the habitation of ants. FORMICARIA, n. plu. *för'mī-kār-ī-ā*, glass ant-houses for scientific observation. FORMIC ACID ($\text{CHO}(\text{OH})$), an organic acid obtained originally from *Formica rufa* or the red ant; the simplest of the fatty-acid series. In a concentrated state, it is a fuming liquor with an irritating odor, and occasions vesication if dropped upon the skin. It crystallizes at a temperature below 32° , and boils at about 212° , yielding a vapor which burns with a blue flame. It is a strong reducing agent, at a boiling temperature reduc-

FORMICARIIDÆ—FORMICINÆ.

ing the salts of silver, mercury, platinum, and gold. It may be obtained in various ways, e.g.: 1. By distillation of red ants with water (a process not now used). 2. By distillation of a mixture of starch, binoxide of manganese, sulphuric acid, and water; this is the usual method, and various organic matters, as sugar, chaff, bran, saw dust, etc., may be substituted for the starch. 3. By distillation of oxalic acid mixed with sand, or far better (according to Berthelot), with glycerine; 1 equivalent of oxalic acid ($C_2H_2O_4$) yielding 1 equivalent of formic acid ($CHO(OH)$), + 1 equivalent of carbonic acid (CO_2). Berthelot has recently obtained it synthetically by keeping carbonic oxide gas for a prolonged period in contact with hydrate of potash, at a temperature of 212° . The gas becomes gradually absorbed, and formate of potash is the result, the reaction being exhibited by the formula, 1 equivalent of hydrate of potash (KOH) + 1 equivalent of carbonic oxide (CO) = 1 equivalent of formate of potash ($COH(OK)$).—Formic acid is a very common product of the oxidation of organic bodies; e.g., the albuminates, glycine, sugar, starch, etc., yield it in association with other products, when acted on by chromic acid; the fats and fatty acids yield it when acted on by nitric acid; and it is a product of the action of ozone on glycerine, fats, fatty salts, acetic acid, and sugar, provided a free alkali is present. Hence, we can readily explain its occurrence as a product of oxidation in the animal organism, in which it frequently occurs, either free or in combination. Thus it is found not only in ants, but also in the poison of the bee and wasp, and in the hairs of the procession caterpillar. It has been detected by various chemists in the sweat, in the expressed juice of the spleen, pancreas, thymus gland, and muscles, in the brain, the blood, and the urine.—The salts of formic acid, termed by some chemists formates, and by others formiates, all are soluble, and yield a red color with persalts of iron.

FORMICARIIDÆ, n. *fawr-mī-kār-ī'ī-dē* [L. *formica*]: ant thrushes; family of birds by some called *Formicarinæ*, and allowed only the position of a sub-family of *Turdidæ* (thrushes). The wings and tail are much shorter than those of the true thrushes, the tip of their bill also is often slightly hooked. They inhabit for the most part the tropical regions of both hemispheres, frequenting forests and thickets, flying feebly from shortness of wing, and consequently most at home on the ground, where they devour ants, coleoptera, etc. The typical genus *Formicarius* is of sober tints, while *Pitta* is of a brilliant azure blue. The Dipper or Water Ouzel (*Cinclus aquaticus*), is an aberrant form of the family or sub-family.

FORMICINÆ, n. *fawr-mī-sī-na* [L. *formica*, an ant]: genus of *Formicidæ*, a genus of aculeate hymenoptera, tribe or sub tribe *Heterogyna*. *F. rufa* is the horse ant. It forms large nests of dry leaves and sticks, in woods.

FORMIDABLE—FORMOSA.

FORMIDABLE, a *för'mĩ-dǎ-bl* [*F. formidable*—from *L. formidābilis*, causing fear—from *formidārē*, to fear: *It. formidabile*]. exciting fear or dread; dreadful. **FOR'MIDABLY**, ad. *-dǎ-bli*. **FOR'MIDABLENESS**, n *-dǎ-bl-nēs*, quality of exciting dread—**SYN.** of 'formidable': shocking; tremendous; fearful; terrible, frightful; horrible; terrific.

FORMING'S ISLAND: a speck on the bosom of the Pacific, a little n. of the Sandwich Group, or Hawaiian Archipelago; lat. $30^{\circ} 49'$ n., and long. $159^{\circ} 20'$ w. It was occupied by Britain, mainly for its excellent harbor, toward the close of 1860.

FORMOSA, *fawr-mō'sǎ* (Chinese name, *Tai-wan*; the other name, meaning 'beautiful,' was given by the Portuguese): large island on the s.e. coast of China, opposite the province of Fo-kien, distant about 90 m.; between $21^{\circ} 53'$ — $25^{\circ} 16'$ n. lat., and $120^{\circ} 15'$ — $122^{\circ} 4'$ e. long.; length, about 250 m.; average breadth, about 60 m. A chain of mountains nearly bisects the island, the highest peak, Mt. Morrison, being 12,850 ft. above sea-level. The population, (census of 1899) 2,705,905, is of various races, but the greater proportion, especially in the interior, is of the Malay type, and is wild to savagery. This island, one of the most beautiful and productive of the large islands of the world, constitutes part of the territorial cession by China to Japan 1895. The cession of F. included an archipelago comprising about 300 islands and islets, known as the Pescadore or Fishermen's islands, between F. and the mainland of China. The Pescadores form a strong military base for the capture and holding of F. For weeks previous to the Japanese occupation, the more civilized region had been the scene of continual disorder, attributed to Chinese intrigue, and a British force was landed to protect the foreign residents. Japan agreed to recognize Formosa Channel as neutral water, and bound herself not to hand over F. and the Pescadores to any other power; also the station of Port Arthur, which had been surrendered to the Japanese 1894, was formally restored to China. In 1896, Japan published her formal declaration to the treaty powers of the accession of F. and the opening of the island to foreign commerce, but disturbances in the island continued in the interior districts, and in the summer assumed alarming proportions in the southern part of the island. At first the insurgents achieved considerable success, but were finally overpowered. Before the Chinese possessed F., 1683, the Dutch were masters of the island. Coal abounds in the n. part, tea is extensively cultivated, and the rice-trade employs many vessels; other products are wheat, maize, sugar-cane, oranges, guavas, pine-apples, cocoa-nuts, grapes, pomegranates, camphor, cinnamon, pepper, etc. The staple crops in the s. are sugar and turmeric, and in the n. tea, much of which is shipped to the United States. The aborigines are slender, olive-complexioned, blacken their teeth, and wear long hair. They are reputed to be honest in their dealings, but extremely revengeful.

FORMS OF ADDRESS.

FORMS OF ADDRESS: proper phraseology in addressing letters to persons distinguished officially or otherwise. In Great Britain, etiquette in this department is much more strict than in the United States, though far less so than in the last generation and times preceding. The forms are frequently modified between persons of equal rank; and in converse among intimate friends and kindred they are now mostly dispensed with, though retained in addressing letters. The ceremonious modes of address proper in Britain are given below—from Dod's *Peerage and Baronage*. In using these, it is in many cases necessary to bear in mind any hereditary, personal, or official distinctions, by which the rank may be modified.

1. *Archbishop*—Letters are addressed: 'His Grace, the Lord Archbishop of——,' and commence: 'My Lord Archbishop.' More formal documents are addressed 'The Most Reverend Father in God (John Bird), by Divine Providence, Lord Archbishop of Canterbury;' other archbishops and suffragan bishops being 'by Divine permission.' When personally referred to, an archbishop is styled 'Your Grace,' not 'Your Lordship.' The Archbishop of Armagh is addressed as 'His Grace the Lord Primate of Ireland.'

Archbishops' wives, and other members of their families, as such, are without titles.

2. *Baron*—Addressed: 'The Right Honorable Lord——;' referred to as 'His Lordship,' or 'Your Lordship.'

Baron's Daughter—'The Honorable Mary——;' or, if married, 'The Honorable Mrs.——.' Letters commence, 'Madam.'

Baron's Son—'The Honorable John——.' Letters commence, 'Sir.'

Baron's Son's Wife—'The Honorable Mrs.——.' Letters commence, 'Madam.'

Baron's Wife, and *Baroness* in her own right—'The Right Honorable Lady——;' in strictness, but more commonly, 'The Lady——.' Letters commence, 'Madam,' and refer to her as 'Your Ladyship.'

Baronet—'Sir John——, Bart.' Letters commence, 'Sir.'

Baronet's Wife—'Lady——.' Unless she has a title as the daughter of a peer, no Christian name is used. She is referred to as 'Your Ladyship.'

Bishop—'The Right Reverend the Lord Bishop of——.' Letters commence, 'My Lord.' Frequently the address is simply, 'The Lord Bishop of——.' The style in formal documents is, 'The Right Reverend Father in God (John——), by Divine permission, Lord Bishop of——.' Scotch bishops are addressed 'The Bishop of——,' sometimes as 'The Right Reverend Bishop (e.g., Henry Cotterell),' and letters commence, 'Right Reverend Sir.' The colonial bishops are addressed by their territorial titles like those of England.

Bishops' Wives and Children have no titles.

Countess—'The Right Honorable the Countess of——.' Letters commence, 'Madam,' and refer to her as 'Your Ladyship.'

Duke—'His Grace the Duke of——.' Letters com-

FORMS OF ADDRESS.

mence, 'My Lord Duke;' and he is referred to as 'Your Grace.'

Duchess—'Her Grace the Duchess of ——.' Letters commence, 'Madam,' and refer to her as 'Your Grace.'

Duke's Daughter—'The Right Honorable Lady Mary ——,' or less formally, 'The Lady Mary ——.' Letters commence, 'Madam,' and refer to her as 'Your Ladyship.' If she is married to a person of inferior rank, her surname only is changed.

Duke's Eldest Son—Uses the second or some other title of his family by courtesy, and he is addressed as if he held the title by law, though in formal documents he is called '——, Esq., commonly called the Marquis or Earl' (as the case may be).

Duke's Younger Son—'The Right Honorable Lord John Russell,' or less formally, 'The Lord John R ——.' 'My Lord, and 'Your Lordship.'

Duke's Younger Son's Wife—'The Lady John ——,' unless where she has a title in her own right. 'Madam,' and 'Your Ladyship.'

Earl—'The Right Honorable the Earl of ——,' or less formally, 'The Earl of ——.' 'My Lord,' and 'Your Lordship.'

Earl's Wife—see *Countess*.

Earl's Daughter—Like Duke's Daughter (q.v.).

Earl's Eldest Son is addressed as if the title which he holds in courtesy were a title in law.

Earl's Younger Son—Like Baron's Son (q.v.).

Earl's Younger Son's Wife—Like Baron's son's wife, unless of superior rank to her husband.

KING—'The King's Most Excellent Majesty.' 'Sire,' and 'Your Majesty;' or, in less formal notes, thus: 'Mr. Pitt presents his duty to your Majesty.'

Knight Bachelor—Like Baronet (q.v.), except that the word 'Bart.' is omitted.

Knight Bachelor's Wife—Like Baronet's Wife (q.v.).

Knight of the Garter—K.G. is added to the name or other title of the bearer.

Knight of St. Patrick—K.P. used in the same manner.

Knight of the Thistle—K.T.

Knight of the Bath—if a Knight Grand Cross, K.G.C.B.; if a Knight Commander, K.C.B.

Knight of the Bath's Wife—Like the wife of a Baronet or Knight Bachelor.

Lord Advocate (of Scotland)—'The Right Honorable the Lord Advocate' by courtesy; but in official documents he is styled 'Her Majesty's Advocate for Scotland.' Letters ought strictly to commence, 'Sir,' not 'My Lord,' though the latter mode of address is usual.

Lord Lieutenant (of Ireland)—'His Excellency the Lord Lieutenant;' and letters commence in accordance with his rank in the peerage or otherwise. If a duke, he is styled 'His Grace the Lord Lieutenant.'

Lord Mayor—'The Right Honorable the Lord Mayor.' 'My Lord,' and 'Your Lordship.' There are only three Lord Mayors—those of London, York, and Dublin.

FORMS OF ADDRESS.

Lord Provost—The Provost of Edinburgh is 'The Right Honorable the Lord Provost; of Glasgow, 'The Honorable the Lord Provost;' of Perth and of Aberdeen, 'The Lord Provost.' There are no other Lord Provosts. Perhaps the distinction in the title of the chief magistrate of the Scottish capital is traceable to his having been always a member of the Privy Council of Scotland, at least since the Revolution.

Lord of Session (in Scotland)—'The Honorable Lord —.' 'My Lord,' and 'Your Lordship.'

Lords of Her Majesty's Treasury—These in their collective capacity are addressed as 'The Honorable the Lords Commissioners of Her Majesty's Treasury;' individually they have no title from their connection with the Treasury.

Maid of Honor—'The Honorable Miss;' and 'Madam.'

Marquis—'The Most Honorable the Marquis of —,' not 'The Most Noble.' Letters commence 'My Lord Marquis;' but when personally addressed, he is styled 'My Lord,' and 'Your Lordship.'

Marchioness—'The Most Honorable the Marchioness of —.' 'Madam,' and 'Your Ladyship.'

Marquis's Daughter—Like Duke's Daughter (q. v.).

Marquis's Eldest Son—Like Duke's Eldest Son (q. v.).

Marquis's Younger Son, like Duke's Younger Son (q. v.).

Mayors—In formal documents, 'The Right Worshipful the Mayor——;' but in letters, simply 'The Mayor.'

Members of Parliament—The letters M.P. are added to their usual address.

Officers in the Navy and Army—Their rank in the service, if above subalterns, is always prefixed to any other title they may possess, thus: 'Captain the Lord John —.'

Prince—'His Royal Highness Prince ——;' or 'His Royal Highness the Duke of ——,' when the Prince is also a Duke. In practice, the initials H.R.H. are usually substituted for the words. A letter begins 'Sir,' not 'My Lord Duke;' and the mode of reference is 'Your Royal Highness.'

Princess—'Her Royal Highness the Princess ——,' or 'The Duchess' (as the case may be). 'Madam,' and 'Your Royal highness.'

Prince's Wife, though of inferior rank, like a Princess by birth.

Privy Councillor—'The Right Honorable John ——.'

Privy Councillor's Wife and Children have no title.

QUEEN—'The Queen's Most Excellent Majesty.' 'Madam,' and 'Your Majesty;' or, 'The Lord John R —— presents his duty to your Majesty.'

Viscount—', 'The Right Honorable Lord Viscount ——,' or less formally, 'The Lord Viscount.' 'My Lord,' and 'Your Lordship.'

Viscountess—'The Right Honorable the Viscountess,' or less formally, 'The Viscountess.' 'Madam,' and 'Your Ladyship.'

Viscount's Daughter, like Baron's Daughter (q. v.).

Viscount's Son, like Baron's Son (q. v.).

FORMS OF ADDRESS.

Viscount's Son's Wife, like *Baron's Son's Wife* (q.v.)

The constitution of the United States provides that no title of nobility shall be granted by the govt., and that no person holding any office of profit or trust under it, shall, without the consent of Congress, accept any title, etc., from any king, prince, or foreign state. The pres. of the United States and the gov. of Mass. are the only citizens possessing as officials a title by legislative act, and in both cases the word is 'Excellency.' Govs. of other states are given the same title by courtesy. When either of these is addressed in writing or officially spoken of, the form is 'His Excellency the President of the United States, or 'His Excellency the Governor of —; and when spoken to 'Your Excellency.' Judges of federal, state, and municipal courts, members of both houses of congress, of state legislatures, and of the president's cabinet, and frequently members of municipal councils are addressed in writing by the courtesy title 'Honorable,' contracted to 'Hon.', and in most cases the name of office follows that of the person, such as 'Hon. —, U. S. Senate;' 'Hon. —, Chief Justice of the (Supreme Court of the) United States;' 'Hon. —, M. C.' Associate justices of the U. S. supreme court and of state, supreme, and superior courts, are addressed in writing with 'Hon.', name, and name of office, but spoken of as 'Mr. Justice —. Officers of the army and navy are addressed in writing by name followed with title of highest rank attained, and, if in command of a military division, naval squadron on station, or on the retired list, by designation of the fact, such as '— Major General, U.S.A., commanding military division of the Atlantic;' '— Rear-Admiral, U.S.N., commanding European Squadron;' '— General U.S.A. Retired.' All official communications of the govt. begin 'Sir.'

Recipients of regular and honorary degrees should be addressed in writing by name, followed by abbreviation of degree in the order A.B., A.M., Ph.D., M.D., D.D., LL.D. A physician or surgeon is spoken of and to as 'Dr. —;' clergyman is addressed in writing and spoken of usually as 'The Rev. —' spoken to as 'Mr. —;' if a doctor of divinity he may be addressed in writing as '—, D.D.', or 'The Rev. —, D.D.', and spoken to and of as 'Dr. —.' A Rom. Cath. cardinal is addressed in writing and spoken of as 'His Eminence —, Cardinal (Bishop, Priest, or Deacon according to rank) of the Holy Roman Church,' and spoken to as 'Your Grace:' an archbishop and bishop may be similarly addressed as 'The most Rev. —, D.D., archbishop of —', and 'The Right Rev. —, D.D., Bishop of —.' In the Prot. Episc. Church, bps. are addressed the same as in the Rom. Cath. Church; and in the Meth. Episc. Church as 'The Rev. Bishop —, D.D.'

Foreign ambassadors to the United States are addressed officially by the titles recognized in their own countries, and if they have no title as 'Mr. —.' followed with title of office; and U.S. ambassadors to foreign countries, officially as 'Mr.' otherwise 'Hon. —.' Some grades

FORMS OF PROCEDURE—FORNIFICATE.

of lawyers as well as justices of the peace are addressed in writing and spoken of in legal documents as '— Esq.', and any gentlemen may be similarly addressed, though 'Mr. —' is preferable. Social custom adds the titles of various officials to the names of their wives when used in introductions or conversation: Mrs. President —, Mrs. Justice —, Mrs. Governor —, but the usage does not extend to daughters. The disposition on the part of the govt. and the most cultured citizens is to ignore titles as far as propriety will permit.

FORMS OF PROCEDURE: see PROCESS.

• FORMULA, n. *fōrm'ū-lă*, FORM'ULÆ, n. plu. *-ū-lē*, or FORM'ULAS, n. plu. *-ū-lās* [L. *formŭlă*, a fine form—from *forma*, a shape: It. *formula*: F. *formule*]: the symbol or symbols expressing the composition of a body; a prescribed form or rule; a general expression for resolving problems; a confession of faith. FORM'ULARY, n. *-lēr-ī*, a book containing prescribed forms, as of prayers, etc.; a ritual. FORM'ULE, n. *-ūl*, a formula. FORM'ULATE, v. *-ū lāt*, to reduce to a formula; also FORM'ULIZE, v. *-līz*. FORM'ULATING, imp. FORM'ULATED, pp. FORM'ULIZING, imp. FORM'ULIZED, pp. *-līzd*

FORMYLE, n. *fōr'mīl* [L. *formīcă*, an ant; Gr. *ūlē*, the material of which a thing is made]: the hypothetical base of *formic* acid: see FORMIC and CHLOROFORM.

FORNACE, n. *fōr'nās*, or FOR'NEYS, n. *-nīs*: old spellings of FURNACE.

FORNIFICATE, v. *fōr'nī-kāt* [L. *fornīcātus*, vaulted, arched; *fornīcātiōnem*, an arching over—from *fornix*, an arch or vault, a brothel—as being at Rome usually under ground]: to commit lewdness, as between unmarried persons. FOR'NICA'TION, n. *kā'shūn*, commerce between unmarried persons; figuratively idolatry. FOR'NICATOR, n. *-tēr*, an unmarried man having commerce with an unmarried woman; an idolater. FOR NICA'TRESS, n. *-trēs*, an unmarried woman guilty of lewdness.—*Fornication*, in most countries, has been a crime brought within the pale of positive law at some period of their history. and prohibited by the imposition of penalties more or less severe; but it has always been found ultimately more expedient to trust to the restraints which public opinion imposes on it in every community which is guided by the principles of morality and religion.—In England, in 1650, during the ascendancy of the Puritan party, the repeated act of keeping a brothel or committing fornication was made felony without benefit of clergy on a second conviction. At the Restoration, when the crime of hypocrisy seemed for a time to be the only one which, under the influences of a very natural reaction, men were willing to recognize, this enactment was not renewed; and though notorious and open lewdness, when carried to the extent of exciting public scandal, continued, as it had been before, an indictable offense at common law, the mere act of fornication itself was abandoned 'to the feeble coercion of the spiritual court, according to the rules of the canon law, a law which has treated the offense of

FORNIX—FORRES.

incontinence with a great deal of tenderness and lenity, owing perhaps to the constrained celibacy of its first compliers.'—*Blackstone*. The proceedings of the spiritual court were regulated by 27 Geo. III. c. 44, which enacts that the suit must be instituted within eight months, and that it cannot be maintained at all after the marriage of the parties offending. But proceedings in the ecclesiastical courts for this offense have now fallen into entire desuetude (*Stephen's Com.* iv. 347).—In Scotland, shortly after the Reformation, fornication was prohibited by what Baron Hume calls 'an anxious statute of James VI.' (1567 c. 13), entitled 'Anent the Filthie Vice of Fornication, and Punishment of the samin.' This act, passed in the same parliament by which incest and adultery are punished with death, provides that the offender, whether male or female, shall pay for the first offense a fine of £40 Scots, and shall stand bareheaded, and fastened at the market-place, for the space of two hours; for the second, shall pay a fine of 100 merks, have the head shaven, and shall be exposed in the same public manner; and for the third, pay a fine of £100, be thrice ducked in the foulest pool of the parish, and be banished the town or parish for ever. There is but one instance of this statute having been enforced by the court of justiciary, which occurs, as might be supposed, during the government of the Protector in Scotland. See NUISANCE: PROSTITUTES.

FORNIX, n. *fawr'nîks* [L. a vault, an arch]: in *anat.*, any part shaped like an arch or vault, as the *fornix conjunctiva*, the globe of the eye; in *bot.*, the lamellæ of the corolla, in some plants like *Cynoglossum*, which are small, scale-like, and overarch the orifice of the tube; in *conch.*, the excavated part under the umbo or beak; the upper or convex shell in the oyster. FORNIX OF THE CEREBRUM, thin layer of white brain-substance in the floor of each lateral ventricle.

FORPASS, or FOREPASS, v. *för-päs'* [*for*, and *pass*]: in *OE.*, to pass unnoticed; to go by.

FORPET, n. *för'pît*: in *Scot.*, a measure, the fourth part of a peck.

FORPINE, v. *för-pîn'* [*for*, and *pine*]: in *OE.*, to waste away.

FORRA- (or FORROW-) COW, n. *för'ră-* or *för'rō-kow*: in *Scot.*, a cow not in calf, and continuing to give milk after the usual time.

FORRAY, n. *för'ā*: another spelling of FORAY, which see, and FODDER.

FORRES, *för'ēs*: royal burgh in the county of Elgin or Moray, Scotland, on a well marked old sea-terrace and promontory, about two m. from the mouth of the river Findhorn (q v.). It was a royal burgh in the reign of King David I. (1124–53), and was subsequently the seat of the Archdeacon of Moray. A painting of St. Laurence holding in his hand the gridiron on which he is said to have been roasted, is preserved at Brodie House near F. The

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antiquities of the place are the remains of its castle, at the w. end of the town, and the remarkable sculptured pillar—25 ft. high—called sometimes Sueno's Stone, but more commonly 'the Stan'in Stane,' about a mile eastward. F. lies at the foot of a curiously formed group of four gravelly hills, named the Cluny or Cleeny Hills, evidently water-made, on the highest of which, the site of an old encampment, is a tower 66 ft. high, erected to the memory of Nelson 1806. On one of these eminences is an excellent hydropathic establishment called Cluny Hill House. Pop. about 4,100.

FORREST, *för'ëst*, EDWIN: 1806, Mar. 9—1872, Dec. 12; b. Philadelphia: actor. He received a common-school education, made his first appearance on the stage as an amateur as Young Norval in *Douglass* before he was 12 years old, and as a professional at the Walnut Street Theatre, Philadelphia, in the title role of the same play 1820, Nov. 27. He achieved immediate success, and at the close of his opening engagement started on a long tour of the western and southern cities, during which he studied and appeared in a number of Shakespearian characters. On his return north he played a few evenings in Philadelphia and Albany and then, 1828, Nov., made his first appearance in New York at the old Bowery Theatre in the character of Othello. He there made a grand impression, and when, at the close of his engagement, he made a tour of the large cities, he was everywhere received with demonstrations of enthusiasm. After these triumphs he made a trip to Europe for recreation and study, returned 1831, and played till 1836, Sep., when he undertook a professional visit to England. He played in Drury Lane Theatre 10 months, appearing as Spartacus in *The Gladiator*, Othello, Macbeth, and King Lear; and was entertained with much cordiality. A warm friendship sprang up between him and William Charles Macready, the English actor, which was unfortunately broken during F.'s visit to England 1845. F. had been hissed while playing Macbeth in London and ascribed the act to Macready's jealousy, and when the latter was playing Hamlet in Edinburgh F. hissed him from a private box. In 1849, May, while Macready was playing Macbeth in the Astor-place opera house, New York, friends of F. made a demonstration of hostility which led to a riot in which 22 persons were killed and 36 wounded. In the following year his wife instituted her celebrated divorce suit, and after two years of stubborn, legal fighting gained it. In 1853 F. retired from the stage for a while; in 1865 he had a stroke of paralysis; in 1871, Feb., he made his last appearance in New York in *Richelieu* and *King Lear*; and the following month his last appearance as an actor, in Boston. He bequeathed his Philadelphia house and his property to trustees for the creation and maintenance of a home for aged actors.

FORREST, NATHAN BEDFORD: 1821, July 13—1877, Oct. 29; b. Bedford co., Tenn.: Confederate general. He became a farmer, planter, real-estate broker, dealer in

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slaves, and extensive cotton-grower; opposed disunion but espoused the Southern cause; raised and equipped a regt. of cavalry at his own expense 1861, July; had his first war experience at Fort Donelson, whence he escaped with his command before the surrender; was promoted brig.-gen. 1862, July 21, maj. gen. 1863, Dec., and lieut. gen. 1865, Feb.; surrendered at Gainesville 1865, May 9; and after the war was a railroad pres. till 1874.

FORREST, URIAH: 1756–1805, July; b. St. Mary's co. Md.: soldier and legislator. He joined the Md. militia early in life, attained the rank of lieut. col. 1776, was wounded at Germantown and Brandywine, and after the revolutionary war was elected auditor of Md., member of both branches of the legislature; was member of congress 1786–7, 1793–95; was maj. gen. of militia; and was clerk of the circuit court of the D. C. 1800 till death.

FORSAKE, v. *för-sāk'* [AS. *forsacan*, to oppose, to refuse—from *for*, away; OE. *sake*, dispute: AS. *sacan*, to contend]: to desert; to abandon; to depart from; to leave. FORSA'KING, imp.: N. act of deserting. FORSOOK', pt. -*sūk*, did forsake. FORSA'KEN, pp. -*sā kn*: ADJ. deserted; abandoned; destitute.—SYN. of 'forsake': to relinquish; desert; quit; assert; reject; renounce; give up; leave; depart; withdraw.

FORSAY, v. *för-sā'* [*for*, and *say*]: in OE., to forbid; to renounce. FORSAYD', or FORSAID', pp. -*sād'*, forbidden.

FORSE, n. *förs*: the old and provincial spelling of *force*, a waterfall: see FORCE 3.

FORSLACK, v. *för-slāk'* [*for*, and *slack*]: in OE., to neglect from dilatoriness or sloth; to miss the proper occasion of doing.

FORSLOW, v. *för-slō'* [*for*, and *slow*]: in OE., to hinder; to delay; to loiter.

FORSOOTH, ad. *för sôth'* [AS. *for*, for; *soth*, truth]: in fact; certainly—used in contempt or irony.

FORSPEAK, v. *för-spēk'* [*for*, against, and *speak*]: in OE., to speak against; to forbid; to bewitch.

FORSPENT, v.: see FORESPENT.

FORST, *först*, or FORSTA, *förs'tā*, or FORSTE, *förs'tā*: town of Prussia in Brandenburg, on an island in the Neisse river, 20 m. e. of Cottbus, 44 m. s.e. of Frankfort-on-the-Oder. It comprises a town proper, near which are the ruins of an old castle, and two suburbs; and has valuable potteries, tanneries, and manufactories of cotton and woollen goods, beside large trade in cattle. F. was founded in the 13th c., burned by Hussites 1430, a possession of the dukes of Sachsen-Merseburg 1667–1740, of the palatinate of Saxony 1740–1815, and thenceforth of Prussia. Altforst was incorporated with it 1874. Pop. (1890) 23,539.

FORS'TER, JOHANN GEORG ADAM (commonly known as George F.): traveller and naturalist: 1754–94; b. Nassenhuben, near Danzig; eldest son of Johann Reinhold F. When only 17 years of age, he accompanied his father in Captain Cook's second voyage; and shortly after his re-

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turn, he published, with the assistance of his father, an account of the expedition. Humboldt spoke of this work in the highest terms. F. for a time prof. of nat. history at Cassel and at Wilna, was librarian to the elector when Mainz was taken by the French 1792. He had become an ardent republican, and was sent as a deputy to Paris, to request the incorporation of Mainz with the French republic. While he was in Paris on this mission, the Prussians retook the city, and F. lost all his property, including his books and manuscripts. He died at Paris. His widow, the daughter of Heyne (Therese Huber), published his *Letters*, 1828; and a complete ed. of his works, 9 vols., was published 1843.

- FORS'TER, JOHANN REINHOLD: 1729-98; b. Dirsehan, Prussia: traveller and naturalist. He was educated at Halle and Danzig for the clerical profession, and in 1753 became pastor at Nassenhuben, near Danzig; but he seems to have given most of his time to the study of mathematics, nat. philosophy, nat. history, and geography. In 1765, he was appointed by the Russian government to inspect the new colonies on the banks of the Volga; and his report is said to have given to Empress Catharine suggestions for her great code of laws. His irritable temper soon involved him in difficulties with the Russian gov.; and in the following year he repaired to England, and became a teacher of nat. history, and of the French and German languages, at an educational institution for dissenting ministers at Warrington, Lancashire. In 1772, he went as naturalist to Capt. Cook's second expedition to the South Seas. His temper seems to have frequently brought him into collision with the other officers; and after the return of Captain Cook's vessels 1774, July, a controversy arose between F. and Lord Sandwich on the question as to who should write the narrative of the voyage. In 1776, in association with his son, F. published a work (in Latin) on the botany of the expedition; and in 1778 his *Observations faites dans un Voyage autour du Monde sur la Géographie Physique, l'Histoire Naturelle, et la Philosophie Morale*. In the latter year, he returned to Germany, and was soon afterward made prof. of nat. history and mineralogy at Halle, where he remained until his death. Besides the above works, he published *De Byssio Antiquorum*, 1775; *Zoologia Indica*, 1781; *Geschichte der Entdeckungen und Schiff-fahrten im Norden*, 1784 (Eng. and French trans.), etc.

FORS'TER, JOHN: 1812-76: b. Newcastle, England: political and historical writer. He was educated for the bar, but early turned to periodical writing, in which he showed more than usual ability; attracting much attention by his political articles in the London *Examiner*, for which he began writing 1834. F. succeeded Dickens for a short time as editor of the *Daily News*, and was editor of the *Examiner* ten years. He wrote many admirable biographical and historical essays, and elucidated obscure points, and corrected erroneous notions about the times and statesmen of the English Commonwealth. To that period

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chiefly F. directed his studies; and no person desirous of properly understanding it, should neglect his *History of the Grand Remonstrance; Arrest of the Five Members; Sir John Eliot, a Biography; and Lives of the Statesmen of the Commonwealth*. His literary memoirs also are excellent. The chief are *The Life of Oliver Goldsmith* (1848); *Walter Savage Landor*, 2 vols. (1868); *The Life of Charles Dickens*, 3 vols. (1871-74); and the first vol. of a *Life of Swift* (1876). F.'s style is clear, forcible, and elegant; his treatment of subjects is pointed and outspoken. He was appointed sec. to the commissioners in lunacy 1856, and a commissioner in lunacy 1861.

FORSTER, The Right Hon. WILLIAM EDWARD: b. Bradpole, Dorset, England, 1818, July 11; son of William F. (1784-1854), who was for more than 50 years a minister of the Society of Friends, and who died on an anti-slavery mission in Tennessee. His mother was sister of Sir Thomas Powell Buxton. He was educated at the Friend's School, Tottenham, and became a worsted manufacturer at Bradford. In 1846 he distributed in Ireland a famine relief fund raised by the Quakers. In 1859, he contested Leeds unsuccessfully in the Liberal interest, and 1861 was elected for Bradford. He filled the post of under-sec. for the Colonies 1865, Nov.—1866, July, was vice-pres. of the committee of council on education and fourth charity commissioner, 1868-74. Mr. F. acquired great reputation from the admirable manner in which he piloted through the house of commons the Education Bill of 1870, and the Ballot Bill of 1871. He became Irish sec. in the Liberal ministry of 1880. The extent to which outrage and intimidation prevailed in Ireland led the government to pass, in the face of the opposition of the Irish party, a Peace Preservation or Coercion Act, giving the Irish administration the power of imprisoning without trial persons reasonably suspected of crime; and on F. was concentrated all the odium of introducing and applying this measure. When, in 1881, the leaders of the Land League were arrested, the bitterness with which 'Buckshot Forster' was denounced throughout Ireland was prodigious; though F. deserved great credit for zeal, determination, and skill in carrying the Land Act of 1881, which conferred unparalleled privileges on the Irish tenantry. In 1882, May, the government resolved to release the chief political suspects; and Mr. F., disapproving this step, resigned office.

FORSTERITE, n. *fawrs'tēr-īt* [named by Levy after Mr. Forster, a patron of mineralogy]: an orthorhombic transparent or translucent mineral, of white, yellowish-white, yellow, gray, or greenish color, and vitreous lustre. There are two varieties, forsterite proper, from Vesuvius and boltonite, from Bolton, Mass. Some authorities make forsterite a variety of olivine.

FORSWAT, a.: see **FORESWART**.

FORSWEAR, v. *för-swär'* [AS. *forswerian*, to forswear, —from *for*, away; *swerian*, to swear]: to swear falsely; to commit perjury; to deny or renounce upon oath. **FOR-**

FORSWONK--FORT DODGE.

SWEAR'ING, imp. **FORSWORE'**, pt. *-swōr'*. **FORSWORN'**, pp. *-swōrn'*.

FORSWONK, n. *för-swunk'* [*for*, intensive, and pt. of OE. *swink*, to labor]: in *OE.*, over-labored.

FORT, n. *fört* [*F. fort*; *It. forte*—from *L. fortis*, strong]: a fortified place; a castle; any stronghold made secure by walls, and generally by a ditch and parapet also: see **FORTIFICATION**. The term has a peculiar meaning in British N. America, formerly in the unsettled territories of the United States, being applied to a trading-post in the wilderness with reference to its indispensable defenses, however slight, against the surrounding barbarism. It has thus been often employed to designate merely a palisaded log-hut, the central oasis of civilization in a wilderness extending hundreds of miles in all directions. **FORTALICE**, n. *fört'äl-is* [*Prov. fortalessa*; *Sp. fortaleza*—from mid. *L. fortālitiā*, a small fort—from *fortis*, strong]: a small fort; a block-house for defense. **FORT'LET**, n. a small fort. **FORTRESS**, n. *fört'rēs*, a place of defense or security; a large fort; a regularly fortified town; a castle; safety. **FORT'RESSED**, a. *-rēs* [*F. forteresse*]: defended by a fortress.—It is the law in England that no subject can build a house of strength embattled, without the license of the sovereign.

FORT AD'JUTANT': staff-officer in a fortress—where the garrison is often composed of drafts from different corps—analogous to the adjutant in a regiment. He is responsible to the commandant for the internal discipline, and the appropriation of the necessary duties to particular corps.

FORTALEZA, *fawr-tā-lä'zā*, or **VILLA DO FORTE**: city, cap. of province of Ceará, Brazil; at mouth of the Ceará river, on a bay in the Atlantic; lat. 3° 42' s. long 38° 30' w. It comprises an old and new town, is regularly laid out and paved, and contains the governor's palace, Rom. Cath. bishop's palace, Latin school, and hospital. It was known as Ceará prior to 1822. Pop. abt. 25,000.

FORT ANN: village of Washington co., N. Y.; on Wood Creek, the Champlain canal, and the Rensselaer and Saratoga railroad; 10 m. s.s.w. of Whitehall, 67 m. n. by e. of Albany. It contains 3 churches, a tannery, and a sash, blind, and door factory, and ruins of an English fort built 1709, and captured from a Continental garrison 1780. Pop. (1890) tp. and v. 2,696; (1900) 2,263.

FORT AUGUSTUS: village at the s. end of Loch Ness, 92 m. s.w. of Inverness. A fort, intended to overawe the Highlands and having accommodation for 200–300 men, was built here soon after the rebellion of 1715, on a small eminence. It was taken by the rebels 1745, and became the headquarters of the Duke of Cumberland after Culloden. In 1867 the fort and crown property adjoining were sold to Lord Lovat, who has since converted it into a Benedictine Educational Institute.

FORT DODGE: city, cap. Webster co., Io.; on the

FORT DUQUESNE—FORTESCUE.

Des Moines river; at junction of the Des Moines and F. D. and the Ia. div. of the Ill. Central railroad; 85 m. n.n.w. of Des Moines, 135 m. e. of Sioux City, 192 m. w. of Dubuque. It contains 7 churches, court-house, large graded school, and Rom. Cath. seminary; manufactories of furniture, plaster, and stucco; several quarries of fine building-stone, valuable deposits of gypsum, fire-clay, and water-lime, and a number of coal mines. Pop. (1870), 3,095; (1880) 3,586; (1890) 4,871; (1900) 12,162.

FORT DUQUESNE: see PITTSBURGH.

FORTE, n. *fört* [It. *forte*, the flower, the best]: strong point; that in which any one excels.

FORTE, ad. *för'tā* [It. *forte*, very much]: in *music*, with force; loudly. FORTISSIMO, ad. *för-tis'si-mō*, very strongly or loudly.

FORT EDWARD: village of Washington co., N. Y.; on the e. bank of the Hudson river and the Champlain canal, and on the Rensselaer and Saratoga railroad at junction of the Glens Falls branch; 22 m. s.s.w. of Whitehall, 28 m. n. of Troy, 34 m. n. of Albany. It contains 6 churches, 1 national bank, F. E. Collegiate Institute, 3 gang saw-mills, 4 potteries, and manufactories of iron, lumber, machinery, castings, and paper. It is prettily situated and has abundant water-power provided by a dam 900 ft. long across the Hudson. A fort was erected here 1709, and a second and larger one 1755, first named Fort Lyman, then F. E. after Edward, Duke of York, and during the French, Indian, and revolutionary wars the place was of much importance. Pop. (1900) 5,216.

FORTESCUE, *fawr'tēs-kū*, CHICHESTER SAMUEL PARKINSON, (Lord CARLINGFORD): Irish statesman: b. 1823, Jan. 18. He was educated at Eton and at Christ Church, Oxford; obtained a first-class in classical honors and the chancellor's prize for a historical essay, 1846: represented the co. of Louth, Ireland, in parliament 1847-74; was a lord of the treas. 1854-5; under-sec. of state for the colonies 1857-8, 1859-65; was sworn a privy councilor 1864; was appointed chief sec. for Ireland 1865, Nov. 20 and 1868, Dec.; became pres. of the London Board of Trade 1870; and at the request of Mr. Gladstone was raised to the peerage as Baron Carlingford 1874, Feb. In 1881, April, he succeeded the Duke of Argyll as lord privy-seal; 1882, Feb. was created a knight of the order of St. Patrick; and 1883, March 17, succeeded Earl Spencer as lord pres. of the privy council. He died, 1898, Jan. 30.

FORTESCUE, Sir JOHN: eminent judge and writer on English law: b. in the reign of Henry IV.; d. in his 90th year (exact date unknown); son of Sir Henry Fortescue, Lord Chief Justice of Ireland; of an ancient Devonshire family. Educated at Exeter College, Oxford, he was called to the bar at Lincoln's Inn, and 1441 was made serjeant-at-law. The following year he was appointed lord chief justice of the court of king's bench. In the struggle for the crown between the Houses of York and Lancaster, he steadily adhered to the latter, and is sup-

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posed to have been for a time lord high chancellor of England. Lord Campbell, in his *Lives of the Lord Chancellors* (I. 367), under date, 1461, Feb. 17, says: 'If Sir John Fortescue ever was *de facto* chancellor, and in the exercise of the duties of the office, it must have been now, after the second battle of St. Albans, and at the very conclusion of the reign of Henry VI.' In March of that year, he fought at the battle of Towton for that monarch, and was attainted by the parliament under Edward IV. He accompanied the queen, Margaret of Anjou, and her young son, Prince Edward, on their flight into Scotland, and while there wrote a treatise in support of the claim of the House of Lancaster to the English crown. In 1463, he embarked with the queen and her son for Holland, where he remained several years, intrusted with the education of the young prince. During his exile he wrote his celebrated work, *De Laudibus Legum Angliæ*, for the instruction of his royal pupil. In the introduction, and throughout the dialogue, he designates himself 'Cancellarius.' It was when he was in Scotland that the title of Chancellor of England is said by some to have been conferred on him by the dethroned monarch. He probably had the titular of chancellor *in partibus* during his exile, but never exercised the functions in England. In 1471, he returned with Queen Margaret and her son; but on the final defeat of the Lancastrian party at the battle of Tewkesbury, where he is said to have been taken prisoner, finding that parliament and the nation had recognized the title of Edward IV., he submitted to that monarch, and, as a condition of his pardon, wrote a treatise in favor of the claim of the House of York. He was allowed to retire to his seat at Ebrington, in Gloucestershire, where he died. His malerepresentative was, in 1789, created Earl Fortescue and Viscount Ebrington in the peerage of Great Britain.

FORT GARRY, *fört gār'ri*: Hudson's Bay Company's station, beside which has sprung up the thriving town of WINNIPEG (q v.), cap. of the province of Manitoba, Dominion of Canada.

FORT GEORGE: fortification in the n.e. of Iverness-shire, Scotland, on a low sandy projection into the Moray Firth here only 1 m. broad. It is the most complete fort in the kingdom, and was built at a cost of £160,000, after the rebellion of 1745, to keep the Highlanders in subjection. It covers 12 acres, and can accommodate 2,000 men. It is an irregular polygon, with 6 bastions, and more than 70 guns. It is defended by a ditch, covert-way, a glacis, two lunettes, and a ravelin. It has casemated curtains, 27 bomb-proof rooms, bomb-proof magazines, and is supplied with water from 8 pump-wells. It is, however, secure from attack by sea only.

FORT GEORGE (INDIA): see MADRAS.

FORTH, ad. *förth* [AS. *forth*, forward: Dut. *voord*, forwards: Ger. *fört*, on further]: forward in place or order; in advance from a given point; onward in time; out; abroad; in OE., thoroughly; from beginning to end. **FORTH'COM-**

FORTH—FORTIETH.

ING, a. about or ready to appear; in the *law of Scotland*, an action by which an arrestment (q.v.) is made available to the arrester—bringing the debtor before the judge that legal decision may issue. **FORTH'GOING**, n. a going forth; a proceeding from: **ADJ.** going forth. **AND SO FORTH**, and other things that might be mentioned.

FORTH: river of Scotland, rising in the n.w. of Stirlingshire, in the mountains between Loch Katrine and Loch Lomond, from two main branches, the Duchray (16 m. long), from the e. side of Ben Lomond, and the Avendhu (12 m. long), flowing through Lochs Chon, Dhu, and Ard. These streams unite at Aberfoyle, and issue from the mountains. The F. then runs e. and s.e. along the borders of Perth and Stirling shires, with numerous windings, in a wide valley abounding in picturesque scenery. It passes Stirling, and a little above Alloa it widens out into the Firth of Forth. The F. is only 30 m. long in a straight line from its source to the mouth of the Devon; but, owing to its sinuosities, its real course is more than twice that length. It is navigable for vessels of 100 tons to Stirling. Its chief tributaries are the Teith, the Allan and the Devon.

FORTH, FIRTH OF: arm of the sea, on the e. coast of Scotland, or the estuary of the river Forth: between Clackmannan, Perth, and Fife on the north, and Stirling and the Lothians on the south. It first extends six m. s.e. from where the Devon joins the Forth; then with an average breadth of $2\frac{1}{2}$ m, its course is 10 m. to Queensferry: and finally it extends 36 m. n.e., gradually expanding in width to 15 m. between Fife-Ness and Tantallon Castle on the coast of Haddingtonshire. In 1882-88, a railway bridge was built across the estuary at Queensferry; and at Alloa also a bridge was opened 1885. In 1883-90 the Forth Bridge, a remarkable feat in engineering, was constructed at a cost of \$16,000,000. The waters of the Firth are from 7 to 30 fathoms deep and encircle the Isle of May, Bass Rock, Inchkeith (fortified 1881), Inchcolm, Cramond Isle, etc. On the coast are many fine harbors. St. Margaret's Hope, above Queensferry, is one of the safest roadsteads in the kingdom. The chief rivers which fall into the firth are the Forth, Carron, Avon, Almond, Esk, and Leven. The counties along its shore are the most fertile and best cultivated in Scotland, and include the maritime towns of North Berwick, Leith, etc.

FORTHINK, v. *för-think'* [*for*, and *think*]: in *OE.*, to be sorry for; to repent of.

FORTHRIGHT, ad. *förth-rīt'* [*forth*, and *right*]: in *OE.*, straight forward: **N.** a straight road or path.

FORTHWITH, ad. *förth-with'* [*forth*, and *with*]: without delay; immediately.

FORTHY, ad. *för-thī'* [*AS. forthi*, therefore—from *for*, and neut. form *thy*, with the]: in *OE.*, therefore; wherefore.

FORTIETH, a.: see under **FORTY**.

FORTIFICATION.

FORTIFICATION: literally the 'making strong' of any place whatever, be it town, arsenal, camp, house, or the extended position of an army occupying a tract of country, a province, or even a kingdom. In common usage, the term is limited to strengthening by means of walls, ditches, or other stationary obstructions, aided more or less by artillery, which may impede hostile advance. Fortification cannot pretend to render strongholds impregnable, for no works, however skilfully devised, will withstand the continued fire of well-directed artillery, backed by energy and discretion on the part of assailants: its aim is to enable a beleaguered garrison to hold out, without losing ground, until it can be relieved by the advance of allies operating in the field. In fortifying a place, the engineer usually proceeds upon some defined system of entourage; but if he hope for success, his science must be sufficiently elastic to adapt itself to all the natural features of the locality; and from this it follows that a system perfect in theory, and of universal application, will in practice have to undergo modifications, differing in almost every instance. The origin of the art is involved in obscurity. The earliest records of all nations speak of walled cities and forts.

The prime element of all fortification is the parapet (from Italian *para*, before; *petto*, the breast), which may be a wooden stockade, a wall of masonry, or a mound of earth, and is intended to give more or less cover to the defender from the projectiles of his adversary, while he is still able to use his own weapons against the latter. The simplest form of parapet being the mound of earth, the ground adjoining it would probably be dug up for its formation, and from this would naturally ensue the ditch, as an additional means of separating the assailant and the assailed. Starting, then, from this parapet and ditch or fosse, as the elementary forms of defense, the following are concise practical definitions of the parts, adjuncts, and technical names of a fortification.

The first duty of a defender is to prevent the enemy's near approach to any of his works. In developed systems, this is sought to be done by bastions, etc. (see below), which stand out at angles to the general line, so as to afford a fire commanding all parts. But as cases occasionally happen of troops, defended by a mere straight parapet and ditch, having to withstand the advance of the enemy it is necessary to adopt every measure which can obstruct his path, harass his advance, and, if possible, aid in cutting off his retreat in the event of failure.

Abattis (q.v.) are among the simplest obstacles to be improvised, consisting of trees cut down, shorn of their leaves and smaller twigs, having their branches pointed, and then laid close together, in one or more lines parallel to the works, branches outward, and trunks imbedded or pinned down in the earth. Accoutred troops must remove these before they can pass, and the operation of removal under fire from the besieged is very serious indeed.—*Chevaux-de-frise* (see CHEVAL-DE-FRISE for illustration) are pointed iron or wooden rods fixed crosswise in a wooden beam, and until re-

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moved offering a complete obstacle to progress. They are very useful in a breach or other unclosed portion of a work, and are now made in pieces, so as to be portable, and yet ready for immediate putting together. A *cheval-de-frise* is usually 12 ft. long, with a beam 9 inches square.—*Chausse-trapes*, or *Caltrops* (see CALTROP), give serious annoyance to troops advancing, and are especially dangerous in cases of night-attack. Their use is less general than formerly.—*Trous-de-loup* (wolf-traps), deep holes dug, and armed at the bottom with spikes, young trees cut down and their stumps

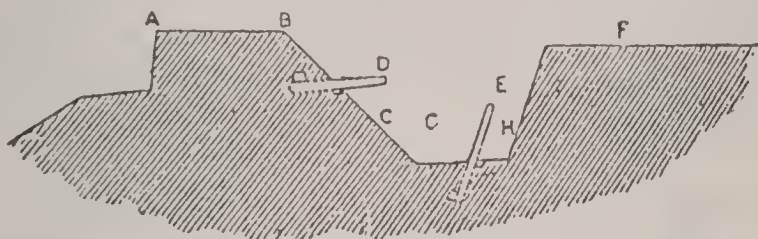


Fig. 1.—Fraise and Stockade (in section):

AB, parapet; C, escarp; D, fraise; E, stockade; F, glacis; G, ditch; H, counterscarp.

pointed, inverted harrows, broken sword-blades, bayonets, or any similar annoyances, are resorted to as expedients to gain time, and thereby insure a more deadly fire on the assailants. They are frequently constructed in the glacis of a work.—*Fraises* and *Stockades* represent another form of additional defense, and are stout posts driven horizontally or perpendicularly into the earth, in long close rows. Fig. 1 shows the use of both these defenses in the ditch of a fortress, and it will be perceived at once how formidable to an

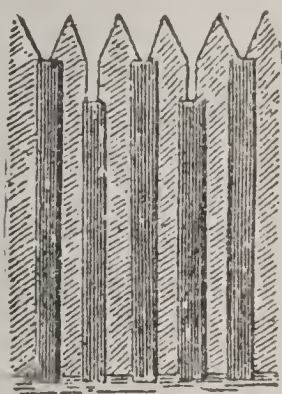


Fig. 2.—Stockade.



Fig. 3.—Double Stockade.

attacking party solid lines of these posts must be. The stockade forms likewise, at times, a good substitute for the parapet itself, particularly when the direct fire of artillery is unlikely to be brought against it, as in warfare with barbarous tribes, or in a work at the very crest of a steep hill. In this case it is usually constructed of two rows of strong palisades firmly imbedded in the ground; the outer nearly square, planted with three-inch intervals between; the second about six inches in diameter, closing these spaces behind. Every second small palisade is cut short a few

inches, so as to leave a loophole for musketry-fire (as in fig. 2). A hill protected in this manner is shown in fig. 3.

CONSTRUCTION OF THE PARAPET.—The object of the parapet being to defend, or *deflade* a certain portion of ground behind it, its height must be calculated so that missiles passing across its crest shall fail to strike the troops mustered behind. The minimum width defiladed to allow of safe communication for troops behind, and actually defending, is 30 ft.; but if the men have to be drawn up in line, not less than 90 ft. will suffice. (The mode of ascertaining the height of parapet necessary in particular cases is shown in fig. 4). Let A be the position at which the parapet is to be made, and AB the space which it is required to

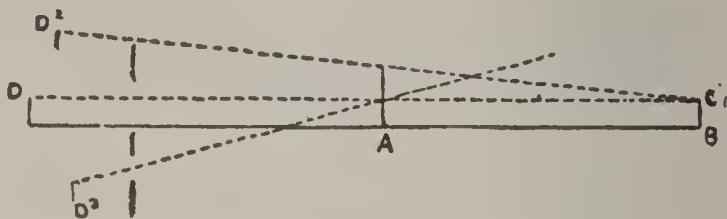


Fig. 4.

deflade to a height throughout equal to BC. D, D₁, D₂, are three points, according to the supposed country round, from which fire could be had at the parapet—one, D, being on the level, the others on ground respectively higher and lower than the parapet: if lines be now drawn from these points to C, their intersection with a perpendicular, raised on the point A, will show the elevation necessary for the parapet protecting the space AB to the height BC. From this, the disadvantage will be apparent of constructing a parapet within range of higher ground, as for every extra foot of elevation in the commanding rise a proportionate addition must be made to the height of the parapet. In practice, the ordinary parapet for a level is eight ft. high, which allows for the depressed trajectory of a spending ball: see PROJECTILES. If the parapet be raised on ground above the attacking position, it may be lowered, according to the angle, to above six ft. six inches, the height necessary for a man standing up to be thoroughly protected. On the other hand, if the position, A, be lower than the point occupied by the assailant, the parapet must be raised; as 12 ft. forms the limit to which a parapet can conveniently be thrown up, further height necessary for protection is obtained by sinking the ground to be defiladed before the parapet's base. In measuring for these heights, the instruments used are *boning-rods*, which are fixed in the ground at D and B, with the normal height of a man marked on them; a third rod at A is then marked at the point where the line of sight between the normal points on the two others intersects it, and so shows the height of the parapet.

The foregoing parapet has been provided only as a straight breastwork, deriving its safety solely from its own fire in a direct line upon the besiegers; but in practice such a rampart would be exposed to the disadvantage of holding but little command over the *scarp* or *escarp* (part cut away) at its foot; so that, if approached under cover, an enemy could

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readily lodge himself therein. To guard against this a work is *flanked*, so that the fire of one part shall take in flank an enemy advancing against another part. See fig. 5. where ABCDE is a flanked or reciprocally defensive parapet, in which it is evident that the fire from AB, DE, must take in flank any force moving on BC or CD, while the latter also, themselves in like manner, flank AB. DE. In a flanked defense of this sort, the angles, A, C, E, which project toward the country, are technically termed *salient angles*; those at B and D, *re-entering angles*. The flanked parapet has often, likewise, the power of defilading larger spaces than the simple line of parapet, since the salient angles can, perhaps, be brought on elevated ground; while the re-entering angles, though with less elevation, may in some de-

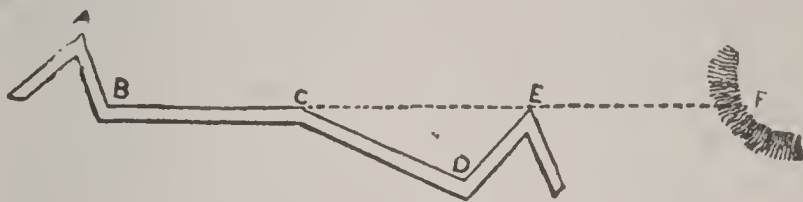


Fig. 5.

gree compensate that defect by greater distance from the front. A disadvantage of flanked defenses is, that the hostile fire crosses the parapet at a less angle than in the straight line, and may, therefore, be more deadly; indeed, the object of the assailant will always be to obtain an enfilade fire *along* one or more parapets of the defense, as (in fig. 5) an enemy posted at F. would be able to sweep the complete line of the parapet CB. To avoid this, the engineer who constructs the works must ascertain minutely the elevation of the surrounding points, and make his salients at such angles that the prolongation of his parapets toward the enemy shall always fall on low ground, whence no command can be obtained.

Now, where the salient angle becomes somewhat acute, and there is an enemy on both fronts, the soldiers defending the right parapet, and standing on its banquette, would be exposed to a *reverse* or back fire from the enemy in front of the left parapet, beyond the defilading of which they would doubtless be. As a remedy, an internal parapet, called a *traverse*, or, from its duty, a *parados*, is raised between the parapets of the salient, its height being determined on precisely the same principles as were made use of in regard to the original parapets. Where both the faces of the salient are un-

avoidably so placed as to be enfiladed, a small work, called a *bonnet*, is constructed at the angle, which consists in the parapet being so raised up to an extra height of 12 ft. if necessary, and at the same time widened, that the banquette shall be defiladed. If a height of 12 ft. is

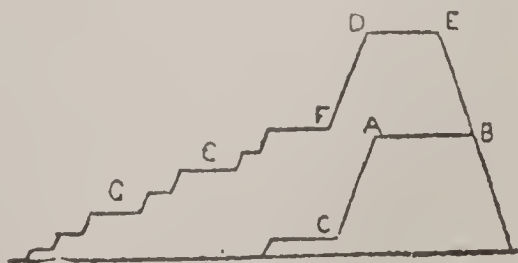


Fig. 6.—Bonnet.

that the banquette shall be defiladed. If a height of 12 ft. is

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insufficient to defilade the whole length of the banquette, traversing parapets must be raised at right angles to the face of the work, and within it, at such distances that the whole may be safe: of course, the height of the bonnet and of the traverses must be decided on rules analogous to those explained in fig. 4. The increased height of the parapet of the bonnet renders it necessary to have two or more banquettes at that portion of the work, with steps to aid the ascent (see section in fig. 6); as AB, the crest of the general parapet, with banquette at C: and DE, the bonnet, with banquettes at F. and G.

In inclosed works—i.e., in works entirely surrounded by parapets—the position of the parapets is of vital importance; and often it needs to be devised with great ingenuity to protect the defenders from reverse fire in any direction, and at the same time not to prevent necessary communication between different portions of the fortress.

Relief means the height of any point in a work above the plane of construction, which may be the line of sight or the bottom of the ditch. In the latter case, the relief of the parapet is an important item in estimating the resisting power of a work, as it represents the vertical equivalent of the obstacle which will be offered to a foe.

When the relief of the parapet's crest has been determined, its thickness becomes the next consideration. The dimensions are laid down on the ground, and depend, first, on the angle at which the material to be used will pile; and then, on the nature of the missiles against which the para-



Fig. 7.—Section of Parapet, Ditch, and Glacis.

pet is to afford protection. For example, an earthwork of from three to four ft. suffices to resist musketry; a thickness of 18 ft. is impervious to the 24-pounder; while larger guns can pound through even more solid obstructions.

Taking fig. 7 as an example, in which *a* is the crest of the parapet, then the banquette *c* should, for convenient firing, be four ft. three inches *a*; its width three ft. if for a single line of soldiers; four ft. six inches for a double rank; its slope should be one in twelve, that water may run freely off. The base, *be*, of the slope up which the men mount to the banquette, should be twice its height *be*, and cut into steps with inclined sides, to allow of easy ascent; and where the height is considerable, a supplemental banquette (on which relieving-men can, if necessary, reload), is desirable. The interior slope, *ac*, of the parapet should be one in four; the exterior slope, or *plongée*, *ad*, intended for the direction of the guns on an assailant, one in six, a deviation being permitted between one in nine and one in four; but the crest being more liable to destruction as the slope of *ab* is augmented, it is best to keep it as small as circumstances will allow; one in six is a usual ordinary slope the angle of

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the interior slope being constant. In some European continental services, however, the angle, *cad*, is kept constant at 100° , by increasing the deviation of the interior slope of the parapet from the perpendicular as the plunge of the exterior is greater. The flatter, however, the crest of the parapet is the better, as sand-bags are in certain cases ranged on it to form cover for the men, while they fire through loopholes left in this additional defense. Earth of medium tenacity maintains its position properly when sloped at an angle of 45° ; and this is the greatest angle which can be counted on for the outer slope of the parapet. The scarp, *l*, and counterscarp, *m*, of the ditch need not have so great an incline, as the ground in which they are cut has usually had time, and the footsteps of ages, to consolidate it. In such cases, the base of the triangle is frequently made equal to half the perpendicular. Cases occur in which steeper banks are considered indispensable; and then, to prevent slips, the earth must have a coating to keep it up, which may be of fascines, hurdles, planks, or sand-bags, for temporary works, or those constructed in the midst of action; while the most solid masonry performs the same function in fortresses of permanent nature. This outer coating is denominated a *revêtement*.

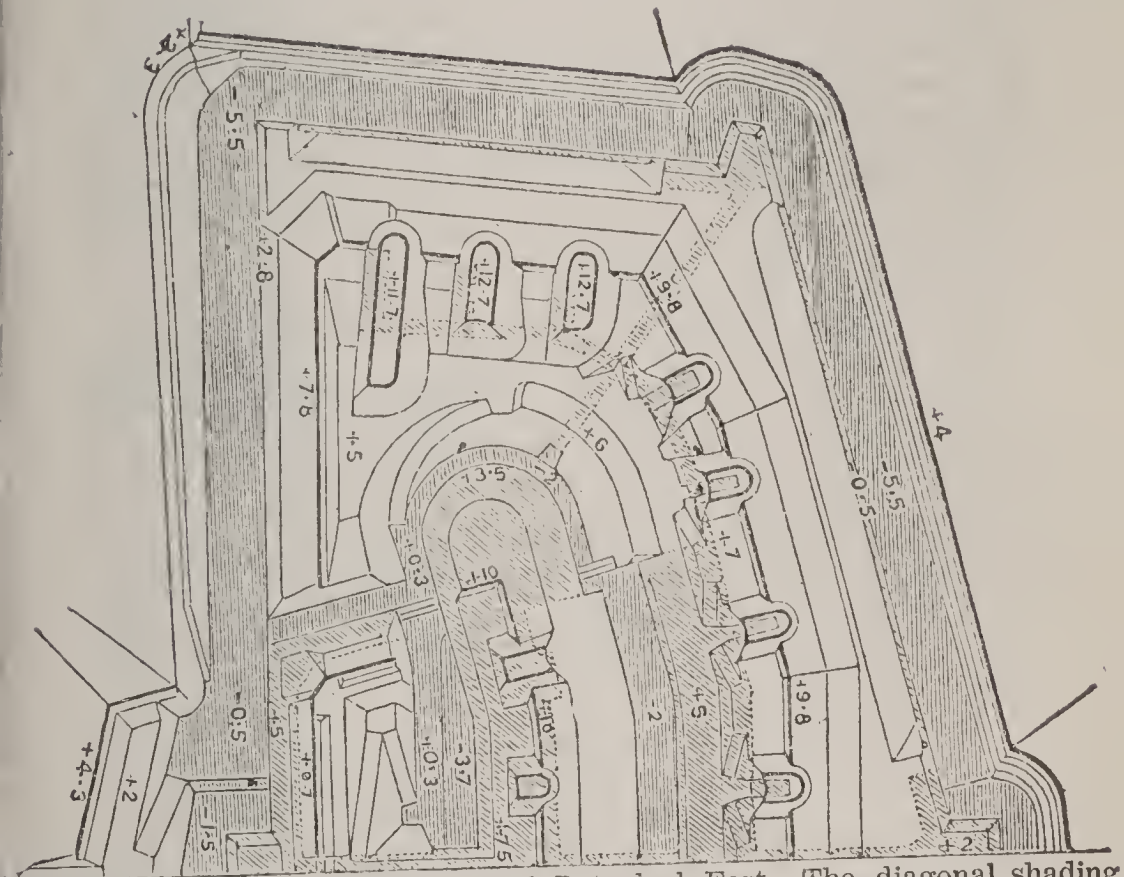
In fig. 7, *ghi*, is the *glacis*, formed during the excavation of the ditch, and having for object the bringing of an advancing enemy into the best line of fire from the parapet. The base and perpendicular of its interior slope, *gh*, should be equal; the slope of the outer face should be one in twelve, unless the slope of the ground render some different angle desirable. An advanced glacis, *k* in fig. 7, is sometimes adopted, in order that the enemy may sooner be brought under fire. It is absolutely necessary that the crest of the parapet should be five and a half ft. higher than the crest of the glacis, as, otherwise, an assailant having reached the latter, would be able to pour a musketry-fire over the former into the work. No part of any glacis, whether near or advanced, should be more than two feet below the line of fire from the parapet—i.e., the line joining the crests of the parapet and glacis continued; if more depth be allowed the enemy may advance in a crouching posture, without being liable to be hit. Advanced glacis are usually made of earth thrown up in prolonging beneath the ground the plane of the preceding glacis. They may be defended entirely from the parapet, in which case palisades or abattis are often fixed (as in fig. 7) to delay the advancing enemy when at the point of greatest exposure. On the other hand, these advanced glacis are occasionally defended as a series of advanced intrenchments, and only abandoned, one by one, as the defenders are driven in toward their main work.

The dimensions of the ditch depend in some measure on the amount of earth required for the parapet and glacis; but in addition to being the mine whence the materials for the latter works are drawn, the ditch must also oppose a considerable obstacle to any hostile advance. To do this effectually, the minimum width across the top is 18 ft.; its depth need be limited only by the trouble of raising the earth;

but in practice 12 ft. is found the greatest which can be conveniently arrived at. Having ascertained the profile of the parapet, with its banquette or banquettes, bonnets, traverses, glacis, etc., it becomes a mere matter of mensuration to compute the area of a section, to multiply it by the length, and so to obtain the cubic feet of earth required. With the length of the ditch known, a very simple calculation then exhibits its width and depth—a small allowance being made for the fact that the earth, dug out from the ditch, where it has probably been long compressed, will occupy somewhat more space when thrown up, and broken into clods, for forming the parapet.—The *scarp*, or inner face of the ditch, is most difficult of ascent by the assailant, when in a continuous line with the parapet (as in fig. 7); but sometimes it would be dangerous to construct the work with this continuity, as damage to the scarp would jeopardize the stability of the parapet. In these cases a narrow step, called a *Berm* (q.v.) of from two to four ft. is made to intervene between the foot of the parapet and top of the scarp: as a precaution, it is covered with all possible obstacles to any lodgment being effected on it by the enemy. When a berm is employed, greater steepness is usually given to the scarp.—The *counterscarp*, or outer sloping side of the ditch, should be somewhat steeper than the scarp. The bottom of the ditch should slope from both sides towards the center, to carry off the water; and obstacles should be scattered about to prevent an enemy from forming his troops in the ditch.

EARTHWORKS IN FIELD FORTIFICATION.—As the most readily constructed, earthworks naturally recommend themselves to the engineer, who, in the field, is called to defend the position of an army against sudden attack. Their utility has been shown in their employment from earliest times; and modern experience tends to prove that earth parapets are of all fortifications among the most difficult to overcome. An army maneuvering before a superior force, can scarcely hope to avoid battle being thrust upon it, unless, strengthened by fieldworks, it be rendered more nearly equal to the adversary. Napoleon, Marlborough, Eugène, Wellington, have given their names as witnesses to the indispensability of such works. The Russian parapets at Borodino made the French victory so sanguinary that it was useless to the victors. A few redoubts at Pultowa saved Peter the Great from total defeat by his formidable Swedish rival. The world-famed lines of Torres Vedras enabled Wellington with 50,000 troops, half of whom were untried Portuguese, to withstand for five months, and ultimately to drive back, the hitherto victorious army of 70,000 French, under such commanders as Masséna, Ney, and Junot. The earthworks surrounding Sevastopol partook greatly of the nature of fieldworks for the protection of a large army, and history will not forget to recount the resistance they offered for almost a year to troops equal to any in the world.

For a line of works whether of earth or masonry, to be efficient, it must combine artillery fire with that of



Fortification.—Fig. 4. Half-plan of Detached Fort. The diagonal shading indicates casemates.

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musketry. The guns will generally be so placed as to command some specific line of approach, such as a ravine, a line of abattis, or some portion of the glacis. They should themselves be as little exposed as possible, nor should the gunners be uncovered more than is absolutely requisite. To effect this, the gun is generally made to fire through an *embrasure* (q.v.) in the parapet, instead of over the latter. The embrasure is a cutting through the solid parapet, 20 inches wide at its inner extremity, and outward half as much as the width of the parapet. In cases where it is necessary, for proper command, that the line of fire should not be lower than the top of the parapet, the embrasure is made through an additional parapet—raised, as in the previous case of the bonnet, above the original one. The bottom of the embrasure is called the *sole*, and slopes downward sufficiently to allow of a certain depression being given to the gun. The remainder of a parapet below the sole is the *genouillère* (from *genou*, a knee), and in field fortification should be three and a half ft. high; the portion between two embrasures is the *merlin* (Ital. *merlone*, battlement); and an embrasure need not cut the parapet perpendicularly, an angle being admissible, when an oblique fire is necessary.

When, however, the obliquity would exceed 70° , it is usual, in order that the thickness of the parapet should not be too much diminished, to form a projecting angle in it, through which the embrasure is cut

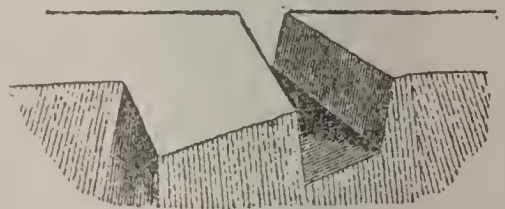


Fig. 8.

(as in fig. 8). The sides of the embrasures are *cheeks*, and require revetting.

A *barbette* is a platform raised behind a parapet, higher than the general interior with a view to guns being fired from it over parapet.

There are certain fixed rules in all fortification, such as:—1. The length of lines must never exceed musketry range, or the flanking-works would become ineffective for their object. 2. The angles of defense should be about right angles. 3. Salient angles should be as obtuse as possible. 4. Ditches should have the best possible flanking. 5. The relief of the flanking-works must be determined by the length of the lines of defense. 6. The value of almost every detached work depends on the support it can give to or receive from an army or other work or works. 7. The reduction of every fortified work is merely a question of time; and a work fairly surrounded is sure to fall, unless relieved from without.

Fieldworks, which, it must be borne in mind, are intended merely to support or strengthen an army, may either have a complete circuit of parapets, or be open at the gorge in the rear. The latter are, of course, the simplest; but they are



Fig. 9.—Redan.

available only in positions which the enemy cannot turn, or

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where protected by the sweeping fire of other works behind. Of this class the *Redan*, a mere salient angle (see fig. 9), is the simplest and the representative form. Of the closed forts, there are *Redoubts* usually square; *Star-forts* now con-

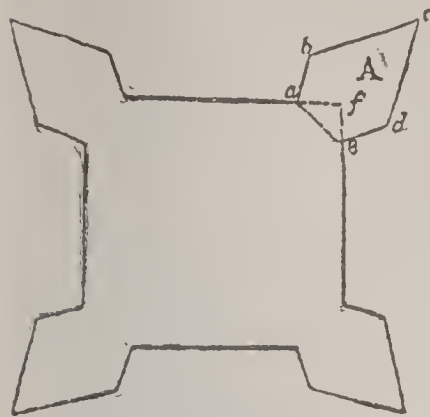


Fig. 10.—Bastioned Fort.

sidered objectionable; bastioned forts, as in fig. 10, which flank their own ditches almost perfectly, while scarcely susceptible of being flanked themselves. To understand the nature of a single bastion, see A (fig. 10), which represents one at the corner of a square work; *ab* is the left flank, *bc* the left face, *cd* the right face, *de* the right flank; *ae* is the gorge; *af*, *fe* are the *demigorges*, being continuations of the sides, or curtains, of the work; *a* and *e*

are the left and right *curtain angles*; *b* and *d*, the left and right *shoulder angles*, and *c* is the *flanked angle*.

Continued lines are simple parapets, either connecting fortified posts, or covering the front or flank of an army. Redans joined by curtains (as in fig. 11) are those most easily constructed; but as the ditches can be defended by only an



Fig. 11.—Continued line of Redans.

oblique fire, the curtains are occasionally so broken as to form nearly right angles with the faces of the redan, as in the dotted line; they then become *lines of tenailles*.

Lines en Crémaillère have long faces with perpendicular flanks. *Lines with intervals* are often as effective as con-



Fig. 12.—Line with intervals.

tinued lines. They consist of detached works, in two lines, within musketry fire of each other. The re-entering angle, *abc* (fig. 12), should as nearly as practicable be a right angle. The celebrated lines of Torres Vedras, before adverted to, consisted of 150 detached forts.—*Tête-du-pont*, is a work to cover the approaches to a bridge: see BRIDGE-HEAD.—A *tenaille* is the reverse of a redan, and consists of two faces forming a re-entering angle: it can be used only in connection with some other work.—A *flèche* is a breast-work of two faces, forming a salient angle, constructed on the exterior of a glacis, usually at its foot, in order to defend the ground before a bastion or ravelin.

Turning from the principal forms of elemental works of fortification, to the permanent systems into which these have been incorporated for the defense of fortresses, towns,

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etc., we may first notice that a *rampart* is a raised structure of earth or stone, above the mean level of the country, on which the parapets, etc., can be thrown up, and which affords to the town or space protected the extra cover of its height, while it elevates the inner works sufficiently to enable them to command and fire over those situated exteriorly to themselves. A line which can be made of earth may equally be constructed of any other material which circumstances may render desirable, the maximum resistance and minimum liability to splinter being the qualities chiefly to be considered.

SYSTEMATIC FORTIFICATION FOR PERMANENT WORKS.—Adverting to the most ancient fortifications in history, we find Greek cities surrounded with walls of brick and rubble, and occasionally of stone in huge blocks. Babylon had a wall of prodigious circuit—100 ft. high, 32 ft. thick, and surrounded by towers. Jerusalem, at the time of Vespasian's siege, had similar walls with masonry of enormous solidity. These seem to represent fortification as it

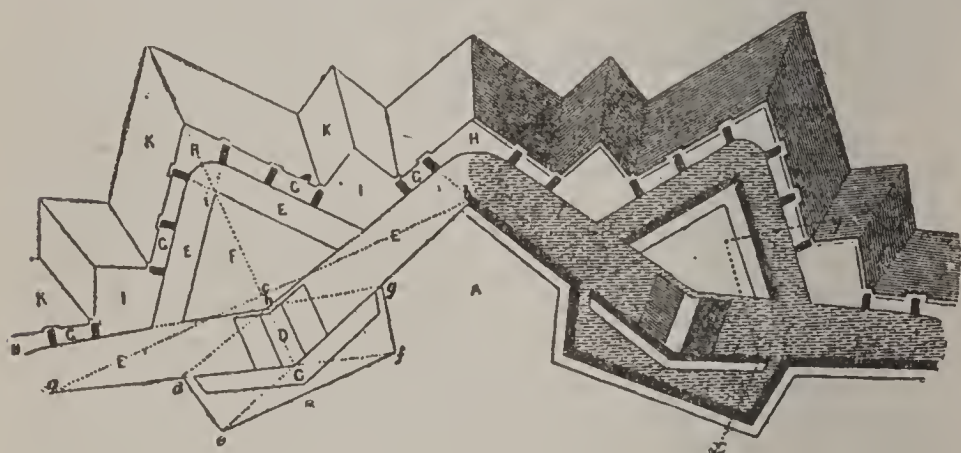


Fig. 13.—Vauban's First System; Ground-plan:

A, bastion; B, curtain; C, tenaille; D, caponnière; E, ditch; F, ravelin;
G, covert-way; H, salient place of arms; I, re-entering place
of arms; K, glacis.

stood from the time of Vespasian to the introduction of cannon for breaching purposes. Then the square and round towers, which had formed sufficient flanking defense against arrows, proved useless when cannon-balls, fired from a distance, were the instruments of assault. At the same time the walls, which had resisted battering-rams, crumbled to atoms under the strokes of artillery.

However, the art of defense has always made equal progress with that of attack; and, early in the 15th, perhaps late in the 14th c., the Italians had commenced to flank their walls with small bastions. The bastions at Verona, built by Michiel 1523, are usually deemed as the oldest extant specimen of modern fortification. Tartaglia and Albert Dürer, painter and engineer, were early in the field. In most of the earlier systems the face of the bastion was perpendicular to its flank. The first principles were successfully improved by Marchi, an Italian (d. 1599), by Errard Bois-le-Duc, and De Ville, under Henry IV. and Louis XIII. of France. The Count de Pagan, whose treatise ap-

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peared 1645, did much toward rectifying previous errors, and laid the basement of that science which Vauban subsequently wrought almost to perfection. Vauban (b. 1633) had a genius which penetrated in every direction, equally in the ways of war and in those of peace. He might possibly have taught how fortresses could be rendered impregnable, had not the restless ambition of his master, Louis XIV., led him to demonstrate, first, that the reduction of any work was a mere question of time and powder. His talent so improved the system of attack, that even he himself could not construct a rampart that should withstand the fire conjured up against it by his discoveries. He constructed 33 new fortresses, improved above 100, and conducted personally more than 50 sieges. To him are soldiers indebted for the sweeping fire of ricochet, and to him in a degree for the traverses which endeavor to render it harmless. Coehoorn, director-gen. of the fortresses of the United Provinces, was the contemporary, rival, and opponent of Vauban; his masterpiece is Bergen-op-Zoom. Cormontaigne, Belidor, Montalembert, Bousmard and Carnot also may be mentioned as conspicuous masters in the science.

Irrespective of irregularities in the form of the place to be defended, a particular polygon is selected as that on



Fig. 14.—Vauban's First System; Profile;

*a, b, banquettes; c, parapet; d, ravêtement; e, escarp;
f, counterscarp.*

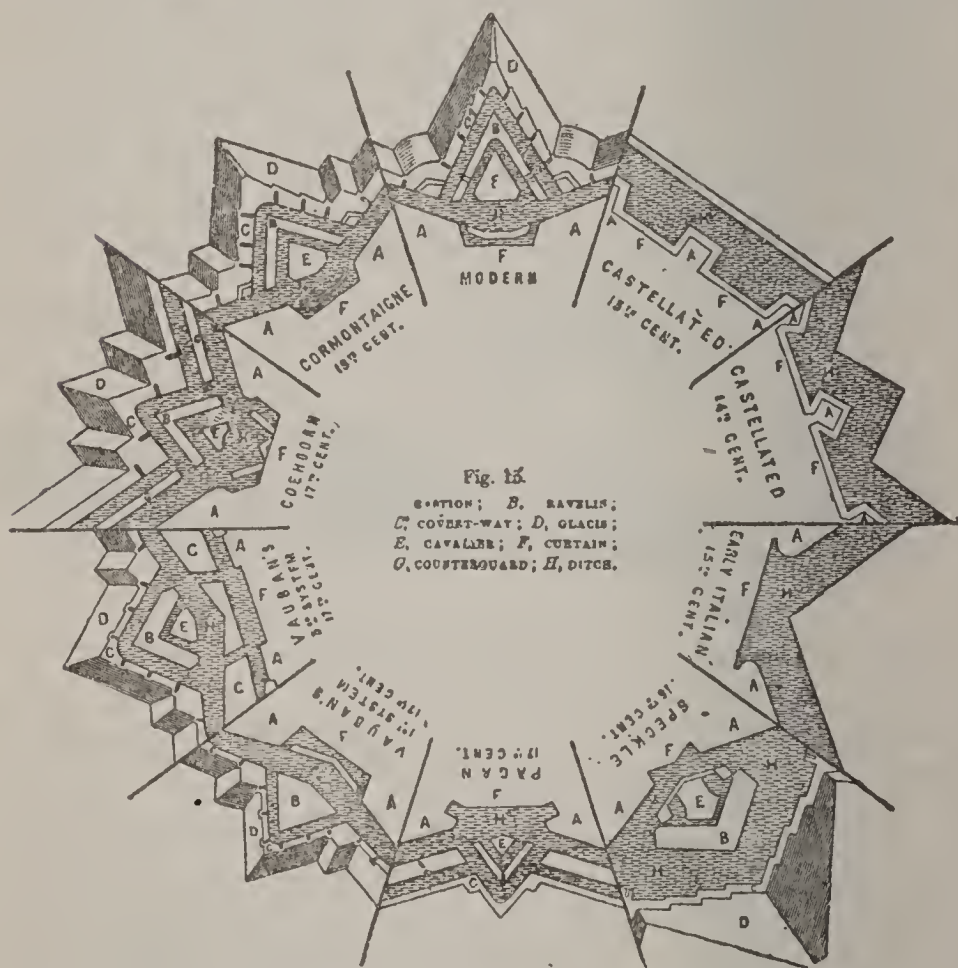
which the lines of defense are to be drawn. Each side of this is a *face of defense*, and the length of a side is rarely made greater than 360 yards.

Vauban's first system is shown in fig. 13 as regards the outline of its ground-plan; fig. 14 displaying the same in profile.

In this instance, the polygon taken is an octagon. Let *ab* (fig. 13) be a side of this polygon: bisect this in *c*, and draw a perpendicular to *ab*. On this, inward, mark off *cC* one-sixth of *ab*; join *aC*, *bC*, and produce the lines; then from *a* and *b* respectively mark off *ad*, *bg*, each equal to $\frac{2}{7}ab$, for the faces of the bastions. Next, from *a* and *b* as centres, with radius, *ag*, describe arcs cutting *aC*, *bC*, produced in *f* and *e*: join *de*, *fg*, for the flanks of bastions, and *ef* for the curtain of the work. The first line of defense is then complete, the necessary parapets, etc., being of course raised on the site laid out. From an examination of this, it will be seen that the whole space in the front is covered. The faces of the bastions and the curtain command more or less the entire front, while the bastion flanks sweep along the faces of adjoining bastions and along the curtain. In front, however, of the apex of each bastion, the

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line of advance is covered by only an extremely oblique fire. To obviate this, a ravelin, *F*, is constructed on the further side of the main ditch, which commands the doubtful fronts, and, at the same time, forms an outwork capable of assisting in the general scheme of defense. To trace the main ditch, describe from the flanked angle of the bastion, *a*, or *b*, an arc with radius 30 yds (if dry ditch, 36 if wet), and from these arcs draw tangents to the shoulders, *d* and *g* of the opposite bastions. These tangents, meeting in the line *cC*, form the counterscarp line of the main ditch. From *h*, the re-entering angle of the counterscarp, set off 100 yards along the perpendicular to *i*, which will be the apex of the flanked angle of the ravelin. From *i*, draw



lines to points in the faces of the bastions, 10 yds from the shoulder angles; these lines to the points intersecting the counterscarp give the faces of the ravelin. The ditch of the ravelin is 20 yds. wide, with counterscarp parallel to the escarp. The zigzag line now arrived at gives the inner side of the covert way—10 yds wide—behind the glacis, which last slopes gradually toward the country, and is ordinarily the outer work of all. The tenaille is a comparatively low parapet sweeping the depressed interior of the ravelin, and commanded by the bastions and curtain. The caponnière (see CAPONIERE), forming a communication between the tenaille and the ravelin, consists of a passage between two low parapets, each with a glacis sloping toward the ditch, which is swept from the work. Nine ft. clear

are allowed round the traverses on the covert-way: at the re-entering angles of the covert-way, *places of arms* are formed by setting off 30 yards on each side, and with this as gorge, advancing faces inclined to each other at 100° . If the polygon had been a square, cC would have been $\frac{1}{8}ab$; if a pentagon, $\frac{1}{4}ab$; and for any polygon of more sides than seven, $\frac{1}{6}ab$.—*Vauban's second and third systems* were those in which he adapted old walls to his modern improvements. Availing himself of the works already formed, he added counterguards in front of the corner-towers, thereby making hollow bastions, and avoiding the necessity of entirely rebuilding.

Coehoorn's system had counterguards in front of the bastions and parallel to them. The flanked angle of his ravelin had a fixed value—viz., 70° .—*Cormontaigne* widened the gorge of his ravelin, thereby reducing the length of the bastion face available for breaching from without. He also revived the step-like formation of the covered way, originally seen in Speckle in the 16th c., and which gives defenders a continued line of fire from each traverse along the covered-way.—*The modern system* differs little from that of Cormontaigne. The re-entering places of arms have circular fronts instead of angular; the angle of the ravelin is fixed at 60° , and all the best points of older styles are associated.

Fig. 15 represents in one view the systems in force since artillery came into common use, as well as the gradual transition from square towers on castle walls to flanked bastions on modern lines.—For the elements of fortifying against shipping, see MARINE FORTIFICATION; for the principles of attacking fortresses generally, see SIEGE: MINES: MILITARY.

FORTIFY, v. *fór'tî-fî* [F. *fortifier*, to strengthen—from mid. L. *fortificāre*—from L. *fortis*, strong; *faciō*, I make]: to strengthen against the attack of an enemy by forts, works, etc.; to render stronger by forts, etc.; to strengthen against any attack; to invigorate; to confirm. FOR'TIFYING, imp. FOR'TIFIED, pp. *-fîd*: ADJ. made strong against attacks. FOR'TIFICA'TION, n. *-fî-kû'shûn* [F.—L.]: the act of fortifying; a fortified place; the art or science of fortifying places. FORTILAGE, n. *fört'îl-āj*, in *OE.*, a little fort; a block-house. — SYN. of 'fortification': fortress; castle; citadel; bulwark; fort.

FORTIGUERRA, *for-tè-gwër'râ*, NICOLÒ: 1674, Nov. 7—1735, Feb. 7; b. Pistoga: Italian poet. He was intended for the priesthood, and early went to Rome, where the power of the prelate Carlo A. Fabroni, who was his relative, speedily secured him advancement, and where he was ultimately raised by Clement XI. to the dignity of prelate and papal chamberlain. He was an ardent cultivator and protector of letters, yet his own compositions are prized more for a certain rich joviality of imagery and profuse facility of language than for beauty of style or conception. His chief work, *Il Ricciardetto*, was commenced in confutation of friends, who maintained that the

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striking ease and fluency of Ariosto, Berni, and other poets of a similar school, were but apparent, and in reality the fruit of deep art and severe labor. F., in a *few hours* threw off an entire canto of *Il Ricciardetto*, strikingly in imitation of the above poets, and continued the work at random much beyond its originally designed limits. It was published 1738, two years after his death, and met with great favor, notwithstanding the incredible incidents and licentious images with which it is replete.

FORTITUDE, n. *för'ti-tūd* [L. *fortitūdō*, firmness, resolution—from *fortis*, strong: It. *fortitudine*]: that power of mind which enables a person to act or suffer with patience, and without flinching or complaining; endurance; resolution.—**SYN.** of 'fortitude': courage; bravery; resoluteness; strength; firmness.

FORT JACKSON: see JACKSON, FORT.

FORT LEE: village of Bergen co., N. J., at the lower end of the Hudson river palisades, directly opposite 160th st., New York. It contains numerous picturesque residences, 4 churches, an establishment of Capuchins, and several factories, and is a popular resort for summer excursion parties.—F. L. derives its name from the earthworks erected there by the Americans during the revolutionary war. In 1776, Oct., the Americans under Gen. Washington were defeated by the British under Gen. Howe at White Plains, and driven from their position w. of Bronx river. Washington then crossed the Hudson and established himself at F. L., while the British invested Fort Washington, directly opposite on the New York side. Following up their success the British determined on the occupation of F. L., and sent an expedition of 6,000 men against it. Washington aware of his inability to hold the place against such a force abandoned it with large quantities of military stores Nov. 18, and retreated to the Delaware river. Pop. (1890) 1,253.

FORT MADISON, *fört mäd'ĩ-son*: city, cap. of Lee co., Io; on the Mississippi river, and on the Burlington and Southwestern, and the Burlington and Keokuk railroads; opposite Niota, Ill.; 19 m. s.w. of Burlington, 24 m. n. of Keokuk. It contains a court-house, one of the state prisons, acad., high and grammar schools, public library, public hall, 8 churches, and manufactories of agricultural implements, machinery, furniture, sash, doors, blinds, leather, lumber, and boots and shoes. Pop. (1880) 4,679; (1890) 7,901.

FORT MAJOR: staff-officer next to the governor or commandant in a fortress. He is expected to understand the theory of its defenses and works, and is responsible that the walls are at all times in repair.

FORT MORGAN: see MORGAN, FORT.

FORT MOULTRIE: see MOULTRIE, FORT.

FORTNIGHT, n. *fört'nīt* [contr. from *fourteen nights*]: fourteen days, or two weeks—referring back to the time when the day was reckoned from evening to evening: so we have *se'nnight*, or *sennight* for *sevensnight*—that is, **seven nights and seven days**.

FORTRESS—FORT ROYAL.

FORTRESS, n.: see under FORT.

FORTRESS MONROE, *fawr'trēs mŭn-rō'*: defensive work on Old Point Comfort, Va.; commanding the water approach to Norfolk and the Gosport navy yard; on the n. side of the channel, 1 m.* from Fort Wool on the s. side. It is the only fortification in the United States designated a fortress, covers 80 acres, was begun 1817, is an irregular hexagon in shape, has three channel fronts, is bastioned, has a tide-water ditch 8 ft. deep at high water, and a scarp wall rising 17 ft. above high water, and has cost \$2,818,000. It was designed by Gen. Simon Bernard, French lieut.gen. of engineers, who was commissioned brev.brig.gen. of U. S. engineers by Pres. Madison under a resolution of congress 1816. He intended making it a great fortified place rather than a simple fort, with accommodations for 371 guns exclusive of mortars, howitzers, and field-pieces; but his designs were measureably restricted. During the civil war it was a post of inestimable importance to the Federal govt., the rendezvous of thousands of troops, and the point of organization and departure of numerous military, naval, and combined expeditions. Since the war it has undergone considerable alteration in keeping with the necessities of modern warfare, and is now arranged to mount 118 guns and 18 flanking howitzers in casemates, and 51 guns *en barbette*.

FORTROSE, *fōrt-rōz'*, or FORTROSS, *fōrt-rōs'*: Scotch parliamentary and royal burgh, seaport, and watering-place in the e. of Ross-shire, on the w. side of the Moray Firth, opposite Fort George, ten m. n.n.e. of Inverness. F. had a fine cathedral and a bishop's palace; but both were partially destroyed under Cromwell, and the stones sent to Inverness, to be used in building a fort there. F. is now of little importance; but, in the 16th c., it had considerable trade, and is said to have been the seat of arts, science, and divinity in the n. of Scotland. Previous to 1444 it was known by the name of Chanonry.

FORT ROYAL: fortified seaport of the French island of Martinique, W. Indies; capital of the colony. It stands on the w. coast, on P. R. Bay; lat. 14° 35' n., and long. 61° 4' w.; and contains offices for the local govt., barracks, arsenal, and hospital. Pop. abt. 12,000.

FORTS OF THE UNITED STATES.

FORT ST. DAVID: town on the coast of the **Madras** province, dist. of South Arcot, 100 m. s. of Madras. It became British 1691, and was an important place during the struggle of England with France. It was cap. of the English settlements in the Carnatic 1746-58; after which it soon decayed.

FORT ST. PHILIP: see JACKSON, FORT.

FORT SCOTT: city, cap. of Bourbon co., Kan.; on the Marmiton river, at the crossing of the Missouri Kansas and Texas, and the Missouri River F. S. and Gulf railroads, and the terminus of the F. S. Southeastern and Memphis railroad, 48 m. n.e. of Parsons, 98 m. s. of Kansas City 111 m. s.w. of Sedalia, 380 m. w. of St. Louis. It contains a court-house, high, normal, and grammar schools, 10 churches, 2 national banks, 2 iron foundries, 2 machine shops, 3 flouring mills, woolen mill, grain elevator, paint and cement works, and 2 daily newspapers. The chief industry is the mining and shipping of bituminous coal that abounds in the vicinity. Pop. (1870) 4,174; (1880) 5,372; (1885) 7,867; (1890) 11,946; (1900) 10,322.

FORT SMITH: city, cap. of Sebastian co., Ark.; on the Arkansas river at junction of the Potean; w. terminus of the Little Rock and F. S. railroad; on the Indian Terr. border; 158 m. w. of Little Rock. It contains 10 churches, acad., national bank, 2 flouring mills, planing mill, tannery, and wagon and agricultural implement factories. It is at the head of navigation, and has large trade in cotton, hides, fur, lumber, grain, and coal. The U. S. dist. court for the trial of criminal causes in Indian Terr. is located here. Pop. (1870) 2,227; (1880) 3,099; (1900) 11,587.

FORTS OF THE UNITED STATES: posts, armories, arsenals, and ordnance depots of the U. S. army, as reported 1903, Jan. 1. Those not garrisoned are indicated thus,*.

POSTS.

Adams, Fort	R. I.	Columbus Barracks	O.
Alcatraz Island	Cal.	Columbus, Fort	N. Y. H.
Allegheny Arsenal	Pa.	*Constitution, Fort	N. H.
Andrews, Fort	Mass.	Crook, Fort	Neb.
Angel Island	Cal.	Dade, Fort	Fla.
Apache, Fort	Ariz.	D. A. Russell, Fort	Wyo.
Armistead, Fort	Md.	Davis, Fort	Tex.
Army and Navy Gen. Hosp.,	Ark.	*Delaware, Fort	Del.
Assinniboine, Fort	Mont.	DeSota, Fort	Fla.
Baker, Fort	Cal.	Douglass, Fort	Utah.
Banks, Fort	Mass.	DuChesne, Fort	Utah.
Barrancas, Fort	Fla.	DuPont, Fort	Del.
Bayard, Fort	N. M.	Eagle Pass Camp	Tex.
Benicia, Barracks	Cal.	Egbert, Fort	Alas.
Bliss, Fort	Tex.	Ethan Allen, Fort	Vt.
Boise, Barracks	Id.	Flagler, Fort	Wash.
Brady, Fort	Mich.	*Foote, Fort	Md.
Brown, Fort	Tex.	Foster, Fort	Me.
*Canby, Fort	Wash.	Fremont, Fort	S. C.
*Carroll, Fort	Md.	*Gaines, Fort	Ala.
Casey, Fort	Cal.	Gibson, Fort	Ind. T.
*Caswell, Fort	N. C.	*Gorges, Fort	Me.
Clark, Fort	Tex.	Grant, Fort	Ariz.
Clinch, Fort	Fla.	*Griswold, Fort	Conn.
Columbia Arsenal	Tenn.	Hamilton, Fort	N. Y.
Columbia, Fort	Wash.	Hancock, Fort	N. J.

FORTS OF THE UNITED STATES.

POSTS.

Harrison, Fort.....	Mont.	*Pulaski, Fort.....	Ga.
Heath, Fort.....	Mass.	Reno, Fort.....	Okla.
Howard, Fort.....	Md.	Revere, Fort.....	Mass.
Huachuca, Fort.....	Ariz.	Riley, Fort.....	Kan.
Hunt, Fort.....	Va.	Ringgold, Fort.....	Tex.
*Independence, Fort.....	Mass.	Robinson, Fort.....	Neb.
Indianapolis Arsenal.....	Ind.	Rodman, Fort.....	Mass.
Jackson Barracks.....	La.	*Rosecrans, Fort.....	Cal.
Jackson, Fort.....	La.	Sam Houston, Fort.....	Tex.
Jefferson Barracks.....	Mo.	San Diego Barracks.....	Cal.
*Johnston, Fort.....	N. C.	*Scammiel, Fort.....	Me.
Kennebec Arsenal.....	Me.	Schuyler, Fort.....	N. Y.
Keogh, Fort.....	Mont.	Screven, Fort.....	Ga.
Key West Barracks.....	Fla.	*Sewall, Fort.....	Mass.
*Knox, Fort.....	Me.	Sheridan, Fort.....	Ill.
*Lafayette, Fort.....	N. Y.	*Ship Island.....	Miss.
Lawton, Fort.....	Me.	Sill, Fort.....	Okla.
*Lincoln, Fort.....	N. D.	Skagway.....	Alas.
Liscum, Fort.....	Alas.	Slocum, Fort.....	N. Y.
*Livingston, Fort.....	La.	Smallwood, Fort.....	Md.
Logan, Fort.....	Colo.	Snelling, Fort.....	Minn.
Logan H. Roots, Fort.....	Ark.	*Standish, Fort.....	Mass.
*Macon, Fort.....	N. C.	*Stark, Fort.....	N. H.
Madison Barracks.....	N. Y.	Stevens, Fort.....	Ore.
Mausfield, Fort.....	R. I.	*St. Francis Barracks.....	Fla.
*Marion, Fort.....	Fla.	St. Philip, Fort.....	La.
Mason, Fort.....	Cal.	St. Michael, Fort.....	Alas.
*McClary, Fort.....	Me.	Strong, Fort.....	Mass.
McDowell, Fort.....	Cal.	Sullivan's Island.....	S. C.
McHenry, Fort.....	Md.	Sumter, Fort.....	S. C.
McIntosh, Fort.....	Tex.	*Taylor, Fort.....	Fla.
Mackenzie, Fort.....	Wyo.	Terry, Fort.....	N. Y.
McKinley, Fort.....	Me.	Thomas, Camp.....	Ga.
McPherson, Fort.....	Ga.	Thomas, Fort.....	Ky.
McRee, Fort.....	Fla.	Totten, Fort.....	N. Y.
Meade, Fort.....	S. D.	*Travis, Fort.....	Tex.
Michie, Fort.....	N. Y.	Trumbull, Fort.....	Conn.
*Mifflin, Fort.....	Pa.	Vancouver Barracks.....	Wash.
Milay, Fort.....	Cal.	Wadsworth, Fort.....	N. Y.
Missoula, Fort.....	Mont.	Walla Walla, Fort.....	Wash.
Monroe, Fort.....	Va.	War en, Fort.....	Mass.
Montgomery, Fort.....	N. Y.	Waslakie, Fort.....	Wyo.
Morgan, Fort.....	Ala.	Washington Barracks.....	D. C.
*Moultrie, Fort.....	S. C.	Washington, Fort.....	Md.
Mott, Fort.....	N. J.	Wayne, Fort.....	Mich.
Myer, Fort.....	Va.	West Point.....	N. Y.
Myer, Fort, Signal Post.....	Va.	Wetherill, Fort.....	R. I.
Niagara, Fort.....	N. Y.	Whipple Barracks.....	Ariz.
Niobrara, Fort.....	Neb.	Williams, Fort.....	Me.
*Oglethorpe, Fort.....	Ga.	Winfield Scott, Fort.....	Cal.
Ontario, Fort.....	N. Y.	Wingate, Fort.....	N. M.
*Phoenix, Fort.....	Mass.	Winthrop, Fort.....	Mass.
Pickens, Fort.....	Fla.	Wood, Fort.....	N. Y.
Plattsburg, Barracks.....	N. Y.	Worden, Fort.....	Wash.
*Popham, Fort.....	Me.	Wright, H. G., Fort.....	N. Y.
Porter, Fort.....	N. Y.	Wright, Fort.....	Wash.
Preble, Fort.....	Me.	Yates, Fort.....	N. D.
Presidio of San Francisco.....	Cal.	Yellowstone, Fort.....	Wyo.

ARMORIES, ARSENALS, AND ORDNANCE DEPOTS.

Augusta Arsenal.....	Ga.	Sandy Hook Proving Ground.....	N. J.
Benicia Arsenal.....	Cal.	San Antonio Arsenal.....	Tex.
Frankford Arsenal.....	Pa.	Springfield Armory.....	Mass.
New York Arsenal.....	N. Y.	U. S. Powder Depot.....	N. J.
Rock Island Arsenal.....	Ill.	Watertown Arsenal.....	Mass.
St. Louis Powder Depot.....	Mo.	Watervliet Arsenal.....	N. Y.

FORT SUMTER—FORTUNATUS.

FORT SUMTER: see SUMTER, FORT.

FORTUITOUS, *a. fôr-tū'î-tūs* [L. *fortu'itūs*, that happens by accident—from *fors*, chance: It. *fortuito*: F. *fortuit*]: happening by chance; casual: accidental. FORTUITOUSLY, *ad. -lī*. FORTUITOUSNESS, *n. -nēs*. FORTU'ITY, *n. -î-tī*, accident; chance. FORTU'ITISM, *n. -tīzm*, in *phil.*, theory that adaptations in nature are produced by natural laws operating 'fortuitously,' by which is meant undesignedly, but not capriciously or independently of all law. Fortuitism is the opposite from belief in a final cause, or teleology. FORTU'ITIST, *n. -tist*, one who adopts or defends the principles of fortuitism, as opposed to a teleologist or believer in the doctrine of a final cause.

FORTU'NA, *fôr-tū'na*, called by the Greeks, *Tyche*: in classical myth. the Goddess of Chance. According to Hesiod, she was daughter of Oceanus; according to Pindar, sister of the Parcæ. She differed from Destiny or Fate, so far that she worked without law, giving or taking away at her own caprice, and dispensing joy or sorrow indifferently. She had temples at Symraa, Corinth, and Elis. In Italy, she was extensively worshipped from a very early period; and had many names, such as *Patricia*, *Plebeia*, *Equestris*, *Virilis*, *Primigenia*, *Publica*, *Privata*, *Muliebris*, *Virginensis*, etc., indicating the extent and the minuteness of her superintendence. Particular honors were given her at Entium and Præneste; in the temple of the former city, two statues of her were even consulted as oracles. Greek poets and sculptors generally represented her with a rudder, as a symbol of her guiding power; or with a ball, or wheel, or wings, as a symbol of her mutability. The Romans proudly affirmed that when she entered their city, she threw away her globe, and put off her wings and shoes, to indicate that she meant to dwell with them forever.

FORTUNATE ISLANDS: see CANARIES.

FORTUNATUS, *fôr-tū-nā'tūs*: title of one of the best 'folk-books' (for the common people) (*Volksbücher*) ever written. It originated about the middle of the 15th c., though many of the tales and legends in it are of much older date. The opinion that it was worked up into German from a Spanish or English original may be considered as abandoned. The substance of the book is that F., and his sons after him, are the possessors of an inexhaustible purse of gold and a wishing-cap, which in the end, cause their ruin: the moral is, that worldly prosperity alone is insufficient to produce lasting happiness. The oldest printed edition of the book now extant bears the date Frankfurt am Maine 1509. Later German editions mostly bear the title, *Fortunatus, von Seinem Seckel und Wunsch-hütlein* (Fortunatus: Story of his Purse and Wishing-cap. Augsb. 1530; Nürnberg 1677; and Basel 1699). It has been reprinted in Simrock's *Deutsche Volksbücher* (3 vols. Frankt. am Maine 1846). Various French versions of the German story have appeared from time to time, as the *Histoire de Fortunatus* (Rouen 1670); which served as the ground-

FORTUNATUS—FORTUNE.

work of the Italian *Avvenimenti de Fortunatus e de' Suoi Figli* (Naples 1676). From the German original, have sprung, with others, the Dutch version *Een Nieuwe Historie van Fortunatus Borse en van Zijnen Wensch hoed* (Amst. 1796); later, the English *History of Fortunatus and his Two Sons* (London, no date); the Danish *Fortunati pung og ønskehat* (Kopen. 1664, 72, 95, 1756, 83); the Swedish *Fortunatus* (1694); and about 1690, two Icelandic versions, one in verse, another in prose. The first to dramatize the subject was Hans Sachs, in his *Der Fortunatus mit dem Wunschseckel* (1553), after whom was the English Thomas Decker with his *Pleasant Comedie of Old Fortunatus* (1600), a work which had the honor to make its reappearance in German about 1620. The most poetical edition of the story is that given by Tieck in his *Phantasus* (3 vols. Berlin 1816). See Grässe's *Die Sagenkreise des Mittelalters* (Dresd. and Leip. 1842), and Ersch and Gruber's *Encyclopædie* (sect. 1, vol. 46).

FORTUNATUS, *fawr-tū-nā'tūs*, VENANTIUS HONORIUS CLEMENTIANUS: abt. 530-600; b. Treviso, Italy: bp. of Poitiers and Latin poet. He was educated at Milan and Ravenna, made special study of grammar, rhetoric, jurisprudence, eloquence, and poetry, and (564) removed to France where he spent the remainder of his life. Sigbert, king of Austrasia, received him cordially at his court, and for an epithalamium on the marriage of the king with Brunhild, appointed him court-poet. He remained at court two years, then visited Tours and Poitiers, and, calling on Queen Radegonda, living in retirement in the latter place, was induced to take orders and settle there. He became a presbyter, almoner, and chaplain of the queen, and through the friendship of Bp. Gregory of Tours, bp. of Poitiers 599. His writings, prose and verse, are very numerous, and consist of lives of the saints, hymns, epitaphs, and verses, in honor of his patrons.

FORTUNE, n. *fawr'tūn* or *fawr'chūn* [F. *fortune*—from L. *fortūnā*, luck, prosperity—from *fors*, chance: It. *fortuna*; Gael. *fortan*, fortune]; in *OE.*, a certain heathen goddess (see FORTUNA); destiny; fate; the good or evil that befalls man; chance; accident; wealth; estate; possessions; the lot or portion of a man or woman: V. to fall; to fall out; to happen. **FORTUNATE**, a. *fōr'tū-nāt'* [L. *fortūnātūs*, prosperous, well off]: lucky; successful; happy; prosperous; favored; coming favorably. **FORTUNATELY**, ad. *-lī*. **FORTUNELESS**, a. without wealth; poor; in *OE.*, luckless. **FORTUNE-HUNTER**, a man who seeks to enrich himself by marrying a woman possessed of wealth. **FORTUNE-HUNTING**. **FORTUNE-TELLER**, a person who pretends to foretell the events of one's life; such persons were classed among Vagabonds by a Scottish law 1579, which prescribed for them the penalty of scourging and burning on the ear. **FORTUNE-TELLING**. **FORTUNIZE**, v. *-īz*, in *OE.*, to be endowed with a fortune; to be made happy.—**SYN.** of 'fortune, n': hazard; probability; luck; fate; **fortuity**; haphazard; destiny; event; success.

FORTUNE—FORTUYNIA.

FORTUNE, *fawr'tūn*, ROBERT: 1813-1880, Apr. 13; b. in the county of Berwick, Scotland: botanist and traveler. After completing his education at a Scotch parish school, he served an apprenticeship as a gardener, and obtained employment in the Royal Botanic Garden at Edinburgh. He was afterward employed in the gardens at Chiswick, where his abilities and acquirements attracted the attention of London naturalists. He was, 1842, sent by the Botanical Soc. of London to n. China to make a botanical exploration. His journey was most successful, and he sent home a very large number of new and valuable plants. He gave an account of his adventures in *Three Years' Wanderings in Northern China*, a work which places its author in the foremost rank of contemporary explorers. F., on his return to England, acted for a time as curator of the Physic Garden at Chelsea. In 1842, he was appointed by the East India Company to make investigations in China relative to the cultivation of the tea-plant; and on his return to England he published *Two Visits to the Tea Countries of China*. He was afterward employed by the U. S. govt. to collect seeds, chiefly of the tea-plant, in the East. It was F. who introduced the tea-plant from China into the N. W. Provinces of India. *Yedo and Peking*, published 1863, relates specially to the natural productions and agriculture of the districts visited. F. died at London.

FORTUNY, *fawr-tō'nē*, MARIANO: 1839, June 11—1874, Nov. 21; b. Reno, Catalonia: Spanish artist. He began to paint in boyhood, studied in the Acad. of Barcelona, and (1856) gained the prize which entitled him to live and study in Rome several years at the expense of the state. As soon as he had established himself there he made one round of the galleries, then ignored the grand works of the old masters, and began seeking subjects for his canvas in the everyday life of the streets. He spent three years in this line of character sketching and painting, and then (1859) joined Gen. Prim's expedition to Morocco, and while in Africa was captivated by the splendor and picturesque elements of the prevailing barbarism. The sketches and studies there made were the basis of his later fame and fortune. Returning from Africa he spent some time in Paris, studied the Meissoniers, made a business arrangement with the art-publishing house of Gouffier for the reproduction of his works in Europe and America, and afterward settled permanently in Rome. His chief works are *A Spanish Marriage*, sold for \$15,000; *The Serpent Tamer*, bought by the late A. T. Stewart for a great sum; *The Amateur of Prints*; *A Fantasia at Morocco*; *The Sword Sharpener*; and *The Academicians of Arcadia*. He was a most painstaking artist, and in consequence produced comparatively little, but his pictures were eagerly sought and brought large prices, many water-colors selling for \$5,000 each.

FORTUYNIA, n. *fawr tō'in'ī-a* [named by Shuttleworth after *Fortuyn*, a Dutch collector]: genus of crucifers, typical one of the family *Fortuymidæ*, of the tribe *Orthoploceæ*.

FORT WASHINGTON.

FORT WASHINGTON, CAPTURE OF: 1776, Nov. 16. The public declaration of American independence was followed within a few days by the arrival of the British Admiral Howe in the harbor of New York, vested jointly with his brother with full authority to put down the revolution by pardons or bullets. Failing to negotiate a peace on the basis of abject submission and cravings of royal pardon, he began preparing for hostilities. Reinforcements were hastened to the British army encamped on Staten Island, till Sir Henry Clinton had a force of 35,000 men under his command. To defend New York Gen. Washington gathered troops from Va., Penn., Md., Del., N. J., and New England, and sent Gen. Mifflin to guard Forts Washington and Independence at the n. end of Manhattan island, one just above, the other just below Kingsbridge, the only avenue to the mainland; Fort Lee (q. v.) on the N. J. shore, nearly opposite to Fort Washington; Fort Montgomery on the Hudson, opposite Anthony's Nose; and Fort Constitution, six miles higher up the Hudson river. Chains were stretched across the channel and other obstructions provided, but despite these two British vessels passed up the river unharmed, exchanging shots with Fort Washington on their course. The appearance of the vessels created great alarm, but they made no direct attack upon the forts. In the meantime the British landed at Gravesend. The battle of Long Island was fought Aug. 27. Other British vessels were sent up the Hudson and East rivers. Washington ordered Gen. Heath to secure Harlem Heights and Gen. Putnam to evacuate New York and hasten to the Heights. Hence the main body of the Americans became encamped on the n. of the island across which they threw a double row of lines, $4\frac{1}{2}$ m. below Kingsbridge. Two m. above these lines was Fort Washington, and a few miles below them were the British lines extending from river to river. In Oct. Washington held a council of war which decided that every American post on the island, excepting Fort Washington, should be abandoned, and on the 23d the whole army withdrew across Kingsbridge and established a fortified camp near the village of White Plains. A week later the British attacked and carried Chatterton's Hill, s. of the main camp. Howe's subsequent delays caused Washington much uneasiness and a new disposition of his troops was made, involving the withdrawal of all but about 2,600 men under command of Col. Magaw, which against the commander's judgment was left to hold Fort Washington. Scarcely had the main army retreated and Washington established himself at Fort Lee, when Fort Washington was invested and attacked on all sides, Gen. Knyphausen with six Hessian regts. striking it from the flats near the Hudson, Lord Percy with a division of English and German troops on the s., Gen. Matthews on the e., and Col. Sterling from the Harlem River. Col. Magaw refused to surrender when surrounded, and the attack was made at daybreak. The garrison after a brave resistance was driven from the outer lines into the fort, and there sustained a terrific shelling

FORT WAYNE.

all 1½ o'clock P.M., when further resistance was seen to be impossible, and Col. Magaw surrendered his entire force. The British then sent a force of 6,000 men to invest Fort Lee, and Washington began the dreary retreat to and beyond the Delaware river, followed closely by the British till the river was reached, where the British found no means of crossing its ice-choked waters.

FORT WAYNE, *fōrt wān*: city, cap. of Allen co., Ind.; at junction of the St. Joseph's and St. Mary's rivers, on the Grand Rapids and Indiana, F. W. Jackson and Saginaw, Pittsburg F. W. and Chicago, Cincinnati Richmond and F. W., and the F. W. Muncie and Cincinnati railroads; on the Wabash and Erie canal; 94 m. w.s.w. of Toledo, 142 m. s.s.e. of Grand Rapids, 148 miles e.s.e. of Chicago. F. W. is a substantially built and handsomely planned city, covers nearly 10 sq. m., is regularly laid out with 130 m. of paved and macadamized streets, and is lighted with gas and electricity. In 1900 there were 397 manufacturing establishments, using a capital of \$9,203,613, employing 7,255 persons, paying \$2,928,969 in wages, using \$6,597,414 in materials, and yielding products valued at \$12,525,222. These industries include 12 foundries and machine-shops, 5 railroad shops, 5 spoke and hub factories; 7 lumber planing mills, 3 stove factories, 6 flouring mills, 10 carriage and wagon shops, soap factory, car-wheel shop, woolen mill, linseed oil-works, and an organ factory. Public buildings comprise a court-house, occupying the greater part of a square in centre of the city, built 1862; cost \$100,000; brick jail, built 1872, cost \$100,000; 2 libraries; Masonic temple and opera house, built 1880, cost \$50,000; city water-works, constructed 1880, cost \$300,000. The educational bldgs. include a high school, 16 gram. and primary schools, F. W. Coll. (Meth. Episc.). Concordia Coll. (theol., Ger. Luth.), F. W. Coll. of Medicine, Westminster Semin. for Young Ladies (Presby.), the Acad. of Our Lady of the Sacred Heart (Rom. Cath.), St. Augustine's Acad. (Rom. Cath.). Here are also numerous parochial schools conducted by the Rom. Cath. and German Lutheran Churches. In 1889 there were 35 churches divided denominationally as follows: Meth. Episc, 8; Presb. 5; Rom. Cath. 5; Lutheran 5; German Ref. 2; United Brethren 2; Bapt. 1; Christian 1; Church of God 1; Congrl. 1; Prot. Episc. 1; Evangel. Assoc. 1; English Ref. 1; Jewish 1. There were 5 suburban cemeteries, Lindenwood, over 100 acres; Rom. Cath. 60 acres; Jewish, and 2 German Lutheran. F. W. is the see of a Rom. Cath. bp. Here were (1902) 4 national banks (cap. \$1,050,000) and 2 private banks. F. W. claims to be the oldest settled city in Ind. La Salle visited and erected a stockade on its site 1680, and it afterward became the site of the aboriginal Indian village of Kekionga, cap. of the Twightwee or Miami confederacy. For nearly half a century prior to the conquest of Canada, the French were in undisputed possession. In 1760 they were succeeded by the British; 1763 the Miamis recaptured their stronghold through the Pon-

FORT WILLIAM—FORT WORTH.

tiae conspiracy; and 1794, Gen. Anthony Wayne secured possession of the locality. A fort named in his honor was erected near the intersection of the rivers, and this gave the name to the village, which received a city charter 1840, when it had a population of less than 3,000. Pop. (1870) 17,718; (1880) 26,880; (1890) 35,393; (1900) 45,115.

FORT WILLIAM: village in Inverness-shire, Scotland, near the west base of Ben Nevis, 63 m. s.w. of Inverness, and at the s. end of the Caledonian Canal. A fort was originally built here by General Monk, and rebuilt on a smaller scale by William III. It is an irregular work, with ditch, glacis, ravelin, bomb-proof magazine, and barracks for 100 men. It resisted sieges by the Highlanders 1715 and 1745. It is now converted into private houses. F. W., so long one of the keys of the Highlands, is now, like Oban, only a centre for tourists. Pop. 2,800.

FORT WILLIAM (INDIA): see CALCUTTA.

FORT WILLIAM HENRY, and FORT GEORGE: two forts erected near the shore of Lake George, Warren co., N. Y., by the British; the first by Sir William Johnson at the head of the lake 1755, the other by Gen. Amherst, $\frac{1}{2}$ m. e., 1759. F. W. H. was the scene of important military movements and an Indian massacre, during the old French war in the colonies. In 1757, July, while the fort was garrisoned by 3,000 British troops under Col. Munro, and an additional force of 4,000 men under Gen. Webb, was stationed less than 15 m. from it, the combined French and Indian force of 9,000 men under the Marquis de Montcalm, marched from Ticonderoga and laid siege to the fort, Col. Munro, begged relief of Gen. Webb in vain, and after holding out six days surrendered, under a pledge to be allowed the honors of war and protected till his men could reach Fort Edward. But on withdrawing from F. W. H. the 2,000 Indians that accompanied the French fell upon his men and brutally killed and wounded a large number. The French then destroyed the fort, which long ago became an almost untraceable ruin. On its site stands a large and widely known summer hotel.

FORT WORTH: city, cap. of Tarrant co., Tex.; on Trinity river and the Texas Pacific railroad; 33 m. w. of Dallas, 175 m. n. of Austin. F. W. is known as the 'Queen City of the Prairies,' and, through being the great live-stock market of the southwest, has had a phenomenally rapid growth, particularly since 1874, when the Texas Pacific railroad was extended to it. It is surrounded by thousands of miles of rich rolling prairies; has over 20 m. of macadamized streets; is supplied with water for drinking and cooking purposes by nearly 200 artesian wells, and for stock, sewage, and fire purposes by a costly system of water-works; has over 300 acres of stock yards; and is lighted by gas and electricity. Its industries comprise horse, cattle, and sheep-raising; ice factories; flouring mills; tanneries; and foundries. It is the seat of Texas Wesleyan College, Warren Female Institute, and a Rom. Cath. convent, and has several graded public schools. In

FORTY—FORWARD.

1889, there were 6 national banks (cap. \$1,450,000). **Pop.** (1870) 2,000; (1880) 6,663; (1890) 23,076; (1900) 26,688.

FORTY, n. *för'ti* [AS. *feower*, four; *tig*, ten]: four times ten. **FOR'TIETH**, a. *-ëth*, the fourth ten; the number following thirty-nine.

FORUM, n. *fö'rüm* [L. *förüm*, open place, market-place—from *föris*, out of doors]: in *anc. Rome*, a public place of meeting: in general, the courts of law; a tribunal; a market-place. In Rome the market-places were termed *fora venalia*, and the courts *fora judicialia*. Of the *fora judicialia*, the most ancient and celebrated was the *forum Romanorum*, or, *par excellence*, the *forum magnum*, occupying the quarter now known as the *campo vaccino* (or cattle-market). It stretched from the foot of the Capitoline Hill, where the arch of Septimius Severus stands, to the temple of the Dioscuri; was seven *jugera* in extent, and was surrounded by streets and houses. The boundary on the e. and n. was the *Sacra via*, of which the side nearest the forum was left open; while on the other were corridors and halls, such as those of the *argentarii* (bankers or money-changers). At a later period, the site of these was, for the most part occupied by basilicas and temples. In the e. portion of this space, were held the earliest *Comitia* (q.v.) of the Romans—the *comitia curiata*; hence this part took the name *comitium*, and was distinguished from the F. strictly so called. Here were hung up for the benefit of the public the laws of the Twelve Tables; and after B.C. 304, the *Fasti* written on white tables to inform the citizens when the law-courts were open. The F. in the narrower usage of the word, probably ceased to be employed as a market-place about B.C. 472, when it became the place of assembly of the *Comitia Tributa*. Of the later *fora venalia*, the principal where the *forum boarium* (the cattle-market), the *forum suarium* (pig-market), *piscatorium* (fish-market), *olitorium* (vegetable-market), etc. Public banquets for the populace, and the combats of the gladiators, were, in the time of the republic, usually held in the great F., which contained monuments of various kinds, e. g., the famous *Columna Rostrata* of C. Duilius, in memory of his victory over the Carthaginians. The rostra, or platforms from which public orations were delivered, form the boundary between the F. in its narrower usage and the comitium. After the time of Julius Cæsar and Augustus, the F. *Romanorum* lost its importance as the central point of Roman political life. The other two *fora judicialia* were the *F. Julii* and the *F. Augusti*. See **FORENSIC**. Compare Becker, *Handbuch der Röm. Alterthümer* (Leipsic 1843).

FORUM COMPETENS, *fö'rüm köm'pē-tēnz*, in Law: the court to the jurisdiction of which the party is amenable.

FORWANDER, v. *för-wön'dër* [*for*, intens., and *wander*]: in *CE.*, to wander purposely and wearily; to go astray.

FORWARD, ad. *fö'r-wërd* [AS. *fore*, before; *weard*, towards, situation]: towards a part or place before; in advance of something else; onward: **ADJ.** early in season; too

FORWASTE—FOSCARI.

ready; earnest; eager; quick; hasty; presumptuous or immodest; ready; prompt; in *OE.*, anterior; not behindhand; V. to help onward; to promote; to quicken or hasten; to transmit. *FORWARDING*, imp. promoting; transmitting; business now very extensive in the United States, in which a merchant assumes the expense of transmitting goods, and is compensated therefor by the owners, but has no concern with the particular mode of transportation, and no interest in the goods transmitted. He is not held as a common carrier: see *AGENT*: also *CARRIERS*. *FORWARDED*, pp. *FORWARDER*, n. one who. *FORWARDS*, ad. *-wērdz*, toward the front or forepart; onward. *FORWARDLY*, ad. *-li*. *FORWARDNESS*, n. state of more than usual advance; cheerful readiness; want of due reserve or modesty; boldness.—*SYN.* of 'forward, v.': to advance; encourage; hurry; accelerate; quicken; hasten;—of 'forwardness': promptitude; promptness; impudence; confidence; presumption; eagerness; ardor; zeal; assurance.

FORWASTE, v. *fŏr-wāst'* [*for*, intens., and *waste*]: in *OE.*, to waste utterly; to desolate.

FORWEARY, v. *for-wēr'ī* [*for*, intens., and *weary*]: in *OE.*, to weary excessively; to dispirit with labor; to wear out. *FORWEAR'IED*, pp. *-īd*, worn out.

FOSCARI, *fŏs'kā-rē*, *FRANCESCO*, Doge of Venice: abt. 1370–1457 (ruled 1423–57). His rule was a brilliant period of conquest and prosperity to his country, but a time of unexampled affliction to himself and family. His ambition fired him with passionate eagerness to exalt his reign by the glory of conquest, and speedily involved the state in a severe conflict with the Dukes of Milan; which, however, the doge's great military ability in the end turned into a source of glory and aggrandizement to Venice. His triumph was embittered by the successive loss of three sons; and the one who remained to transmit the name, and succeed to the inheritance of the family, was, 1445, denounced for having received bribes from the hostile generals, to use his influence with the doge in procuring less rigorous terms. Tried for this grave crime before the Tribunal of the Ten, and racked cruelly in view of his father, *Giacopo F.* was banished for life, under pain of death should he attempt to revisit his native land. In 1450, the assassination of one of the 'Council of Ten,' *Hermolao Donati*, was imputed (it seems, without ground) to *Giacopo*, who was consequently summoned from his exile, tried, tortured, and banished a second time on still more rigorous terms to the island of *Candia*. Grown reckless through suffering, and longing to see his home and country on any terms, *Giacopo* petitioned the Duke of Milan to intercede in his behalf with the senate, a step which, by Venetian law, was punished as a high crime, and led to the unfortunate *Giacopo* being for the third time subjected to torture and renewed banishment, on entering into which he died of grief. The doge had vainly besought permission to resign a dignity grown loathsome to him, from its imposing the barbarous obligation of witnessing his son's torture; but in the end he was

deposed, and ordered to vacate the palace in three days. At the age of 87, decrepit from years, and bowed by sorrow and humiliation, Francesco F., supported by his venerable brother, descended the Giant's Staircase, and passed out for ever from the ducal palace, the scene of such vain pomp and bitter misery. Pasquale Malanieri was elected in his stead 1457, and at the first peak of the lens in honor of his elevation, F. expired from the rupture of a blood vessel. Byron's tragedy, *The Two Foscari*, deals with this theme.

FOSCOLO, *fos'ko-lo*, Ugo: abt. 1778-1827, Oct. 10; b. at Zante, one of the Ionian Isles: Italian author. He went for study to Venice in his 16th year, and later to Padua for Melchiorre Cesarotti's noble course of classic literature. His earliest efforts at poetical composition were modelled strictly on his favorite Greek classics; and, as early as 1797, his tragedy, *Il Tieste*, was received with favor by a critical Venetian audience. The dismemberment of the Venetian states, decreed by the treaty of Campo Formio, bitterly incensed F.'s patriotic spirit, and inspired one of his most remarkable works, *Le Lettere di Jacopo Ortis*, which was received with immense popularity. F. repaired to Milan on its being declared cap. of the Cisalpine republic, and there obtained the grade of officer in the Lombard legion. On the downfall of the republic, he retreated with the French into Genoa, where, in the midst of the terrors of a rigorous siege, he composed two exquisite odes to *Luigia Pallavicini Caduta da Cavallo*, and *All' Amica risanata*. F. subsequently entered France with the intention of joining Napoleon's expedition against England, and prepared a much admired version of Sterne's *Sentimental Journey*, to exercise himself in English. On the failure of the plan, he returned to Milan, and prepared a splendid edition of Montecuculi's works, with notes and historical references—*Opere di Raimondo Montecuculi*, per Luigi Mussi (Milan, 1807-8), a very rare edition. At this time, he published his exquisite poem, in blank verse, *I Sepolcri*, which at once placed him among the classic authors of his country. In the same year, he was appointed to the chair of eloquence in Pavia, and occupied the post, until the professorship was suppressed in all the colleges of Italy. His inaugural address, *Dell' Origine e dell' Ufficio della Letteratura*, is a masterpiece of beautiful, noble, and patriotic writing. *Ajace* and *Ricciarda* are tragedies. From the time F. lost faith in the sincerity of Bonaparte's intentions toward Italy, he employed the full powers of his wrath and sarcasm in denouncing his treachery. After various vicissitudes, he finally sought refuge in Britain about 1816, and soon mastered the language sufficiently to contribute to the *Quarterly* and *Edinburgh Reviews*. In London some of his best writings were published—viz., *Essays on Petrarca and Dante*, *Discorso sul testo del Decamerone*, *Discorso storico sul testo di Dante*, and various minor compositions. He died near London. His remains were finally deposited in the Church of Santa Croce, Florence, 1871. His works and letters were published, 12 vols. by Le Monnier (1850-62).

FOSS, CYRUS DAVID, D.D., LL.D.: Bishop of the Meth. Episc. Church: b. Kingston, N. Y., 1834, Jan. 17. He graduated at Wesleyan Univ., 1854; was teacher of mathematics and principal of Amenia Seminary, N. Y., 1854-57; entered the ministry of the Meth. Episc. Church 1857; was stationed at Chester, N. Y., 1857-59, Brooklyn 1859-65, and New York 1865-75; was elected pres. of Wesleyan Univ. 1875, and served till 1880, May 12, when he was elected bishop. He was a member of the gen. conference of the Meth. Episc. Church 1872, 76, 80, and received the degree D.D. from Wesleyan Univ. 1870, and LL.D. from Cornell College, Io., 1879.

FOSSA ET FURCA, or PIT AND GALLOWES: ancient privilege granted by the crown to barons and others, which implied the right of drowning female felons in a ditch, and hanging male felons on a gallows.

FOSSA MARIANA, *fōs'sâ mâ-rē-â'na*: canal dug by the army of Marius while encamped at Arles, near the mouth of the Rhone river B. C. 102. It extended from a point 15 m. above the present mouth of the river to near the Gulf of Stomalinne, and was cut to improve navigation of the mouths of the river and to keep the army employed.

FOSSANO, *fōs-sâ'nō*: town of Piedmont, n. Italy, province of Coni or Cuneo, on the left bank of the Stura, on a hill surmounted by an old castle, 14 m. n.e. of Coni. It is surrounded with old walls, and is well built; but the houses are erected over arcades, under which run the footways, and thus the streets are gloomy. It has a handsome cathedral ten churches, a royal college, and numerous minor educational institutions, silk-factories, paper-mills, and tanneries. Pop. 8,000.

FOSSANO, *fōs-sâ'nō*, AMBROGIO STEFANI DA (AMBROGIO BORGOGNONE, or IL BORGOGNONE): eminent painter of the Milanese school, approximately contemporary with Leonardo da Vinci; date of birth and death unknown. He resided in Pavia 1486-94, when he executed his famous work in the Carthusian church and convent, worked in the church of San Satiro, Milan, 1494-97, and in that of the Incoronata, Lodi, some time from 1497; painted in a church in Bergamo 1508, and executed a series of frescoes illustrating the life of St. Sisinius in the portico of San Sempliciano, Milan, 1524.

FOSSE, n. sometimes Foss, n. *fōs* [F. *fosse*, a ditch, a drain—from L. *fossa*, a ditch, a trench—from *fōdō*, I dig: It. *fossa*]: a hollow place or ditch immediately outside the wall of a fortified place, commonly filled with water, forming an important part of the defenses; a kind of cavity in a bone. Fos'sa, n. -a, a depression; furrow. Fossette', n. -sēt' [F. dim.]: a little hollow; dimple; in *med.*, small ulcer of the transparent cornea, the centre of which is deep. Fos'sulæ, n. -ū-lē, minute cavities or canals; cavities of the joints or hinges of a bivalve shell.

FOSSIL, n. *fōs'sil* [F. *fossile*—from L. *fossilis*, dug up, fossil—from *fossus*, dug]: a mineral dug out of the earth;

FOSSIL.

the remains of plants and animals imbedded in the earth's crust and changed into a stony consistence: **ADJ.** dug out of the earth. **FOS'SILIFEROUS**, a. *-īf'ēr-ūs* [L. *fero*, I bear]: containing organic remains (see **FOSILIFEROUS ROCKS**). **FOS'SILIZE**, v. *-īz*, to convert into a fossil; to become petrified. **FOS'SILIZING**, imp. **FOS'SILIZED**, pp. *-īzēd*: **ADJ.** converted into a fossil. **FOS'SILIST**, n. one versed in fossils. **FOS'SILIZA'TION**, n. *-ī-zā'shūn*, the process of converting animal or vegetable substances into fossils. **FOSSILOLOGY**, n. *jī*, science of fossils. **FOSSORIAL**, a. *fūs-sō'rī-āl*, digging; burrowing. **FOSSIL-PAPER**, **FOSSIL-WOOL**, **FOSSIL-CORK**, etc., familiar terms for certain varieties of amianthus. **FOSSIL BOTANY**: see **PALÆONTOLOGY**.—**FOSSIL FOOTPRINTS**: see **ICHOLOGY**.

FOSSIL: term formerly applied to whatever was dug out of the earth, whether mineral or organic; now restricted to the petrified remains of plants and animals imbedded in the earth's crust, which were formerly, and are sometimes still, called petrifications. They occur in nearly all the stratified rocks, hence called Fossiliferous strata. It is difficult or impossible to detect them in the metamorphic rocks, for the changes that altered the matrix have also affected the organisms, so as either almost or altogether to obliterate them. In the fundamental mica-schist and gneiss they have escaped notice, if ever they existed; but comparatively recent investigation has proved their presence in or among those gneissose rocks which are the greatly metamorphosed representatives of the Lower Silurian Measures in the n. of Scotland: see **GNEISS**.

The conditions in which fossils occur are very various. In some Pleistocene beds the organic remains are but slightly altered, and are spoken of as sub-fossil. In this state are the shells in some raised sea-beaches, and the remains of the huge struthious birds of New Zealand, which still retain a large portion of the animal basis. In the progress of fossilization, every trace of animal substance disappears; and if we find the body at this stage, without being affected by any other change, it is fragile and friable, like some of the shells in the London clay. Most frequently, however, a petrifying infiltration occupies the cavities left in the fossil by the disappearance of the animal matter, and it then becomes hardened and solidified. Sometimes the whole organism is dissolved and carried off by water percolating the rock, and its former presence is indicated by the mold of its outer surface, and the cast of its inner in the rocky matrix, leaving a cavity between the cast and the mold agreeing with the size of the fossil. This cavity is occasionally filled up with calcareous spar, flint, or some other mineral; and we thus obtain the form of the organism, with the markings of the outer and inner surfaces, but not exhibiting the internal structure. The most advanced and perfect condition of fossilization is that in which not only the external form, but also the most minute and complicated internal organization is retained; in which the organism loses the whole of its constituents, particle by particle, and as each little molecule is removed, its place

FOSSIL FERNS—FOSTER.

is taken by a little molecule of another substance, as silica or iron pyrites. In this way we find calcareous corals perfectly preserved in flint, and trees exhibiting in their silicified or calcified stems all the details of their microscopic structure—the cells, spiral vessels, or disk-bearing tissue, as well as the medullary rays and rings of growth. See PALÆONTOLOGY.

FOSSIL FERNS: as far as yet discovered, ferns appearing first in the Devonian period, but then only sparingly, not more than nine or ten species of that age having been observed. In the immediately succeeding Coal-measures, they suddenly reached their maximum development. The dense forests and the moist atmosphere of this period were so suited to their growth that they formed a large bulk of the vegetation. More than 350 species have been described, some of them tree ferns of a size fitting them to be the companions of the immense *Sigillarias* and *Lepidodendrons* whose remains are found associated with theirs in the Carboniferous rocks. 23 species have been found in Permian strata. Many new forms appear in the Trias, and their number is increased in the Oolite. The fresh-water beds of this period contain numerous beautiful ferns, more than 50 species having been described. The marine beds of the Cretaceous period contain very few forms, and in the Tertiary rocks they are equally rare.

FOSSILIFEROUS ROCKS: those which contain organic remains. If we except the lowest metamorphic rocks, in which, as yet, no fossils have been found, the term is equivalent to the 'stratified rocks,' when used comprehensively; but it may be applied also to a particular bed, as when we speak of an unfossiliferous sandstone compared with the neighboring fossiliferous shale or limestone.

FOSSOMBRONE, *fōs-sōm-brō'nā*: small episcopal town of Italy, province of Urbino and Pesaro; pleasantly situated on a hill on the left bank of the Metauro—here spanned by a fine modern bridge—11 m. e. of the town of Urbino. It rose in the 14th c., from the ruins of *Forum Sempronii*, destroyed by the Goths and Lombards. Some interesting Roman inscriptions and remains of the ancient city are in the cathedral of St. Aldobrando. F. is celebrated for its fine manufactures of carpets and woolen cloths, and particularly for the excellent silk of its neighborhood. Three miles from F. is Il Monte d'Asdrubale, famous as the scene of the engagement in which the Carthaginian general was defeated and killed by the Romans B.C. 207. Pop. about 4,500.—See Lauro Giacomo, *Historia e Pianta di Fossombrone*.

FOSSORES, n. *fōs-sōr'ēz* [L. *fossor*, digger, delver; *fodio*, I dig, I delve]: burrowing hymenoptera, sub-tribe of the hymenopterous tribe *Aculeata*. Many of the F. are called sand-wasps. The sub-tribe is divided into eight families, *Scoliadæ*, *Sapygidæ*, *Pompilidæ*, *Sphecidæ*, *Bembicidæ*, *Larridæ*, *Nyssonidæ*, and *Crabronidæ*.

FOSTER, v. *fōs'tēr* [AS. *fostrian*, to foster, to nourish—

FOSTER.

from *foder*, food: Dan. *foster*, offspring: Sw. *fostra*, to foster]: to nourish; to bring up; to cherish; to forward or promote; to encourage; to indulge, as habits. FOSTERAGE, taking charge of the child of another, for care and education. FOSTERING, imp.: ADJ. cherishing; bringing up. FOSTERED, pp. *-têrd*. FOSTERER, n. *-têr-êr*, one who; a nurse; one who encourages. FOSTER-BROTHER, or -SISTER, nursed together, but not of the same parent. FOSTER-CHILD, a child nursed or reared by one not its parent; when the care of such a child is not undertaken in such a way as to amount to adoption (q.v.), there is no established legal relation. FOSTERLING, n. *-ling*, a foster-child. FOSTER-MOTHER, one to whom a child of another is made over to nurse and bring up as her own.—SYN. of ‘foster’: to feed; nurture; support; bring up; patronize; forward; promote; sustain.

FOSTER, *faws'têr*, ABIEL: 1735, Aug. 8—1806, Feb. 6; b. Andover, Mass.: Congl. minister and jurist. He graduated at Harvard College 1756, studied theol., and was pastor of a Congl. Church at Canterbury, N. H., 1761–79. Subsequently he studied law, was elected a member of the N. H. legislature 1780 and several times thereafter; was a member of the continental and federal congresses 1783–4, 1789–91, 1795–1803; was appointed a judge of the N. H. court of common pleas 1784, and afterwards became its chief-justice.

FOSTER, BIRKET: English artist: b. North Shields, Northumberland, 1812. He was educated at Hitchin, Herts, was apprenticed to Mr. Landells, wood-engraver, by whose advice he became a draughtsman, and when 21 years old, established himself as an artist. His early work embraced numerous illustrations for children's books and the *Illustrated London News*, and in later years he illustrated Longfellow's *Evangeline*, Beattie's *Minstrel*, Goldsmith's *Poetical Works*, Tom Taylor's grand work on English landscape, and other high art publications. While associated with Tom Taylor he began painting in water-color, and has since become the most widely known and popular English artist in that line.

FOSTER, CHARLES: statesman: b. Seneca township, O., 1828, Apr. 12. He received a common-school and acad. education, engaged in mercantile business, and became the head of a successful firm. In 1870, 72, 74, 76 he was elected member of congress from the 9th cong. dist. as a republican; in 1878 was defeated for re-election; in 1879 was elected gov. of Ohio, serving till 1884; and in 1891 was appointed sec. of the United States treasury.

FOSTER, *faws'têr*, JOHN: 1770, Sep. 17—1843, Oct. 15; b. in the parish of Halifax, Yorkshire: English essayist. He was educated for the ministry at the Bapt. College at Bristol, but after preaching several years to various small congregations with small success, he applied himself mainly to literature. His *Essays, in a Series of Letters*, were published 1805, while he was officiating as pastor of a Bapt. chapel at Frome, Somersetshire. They were only four

in number—On a Man's Writing Memoirs of Himself; On Decision of Character; On the Application of the Epithet Romantic; and On some of the Causes by which Evangelical Religion has been rendered less acceptable to Persons of Cultivated Taste; yet Sir James Mackintosh did not hesitate to affirm that they showed their author to be 'one of the most profound and eloquent writers that England has produced.' They have been remarkably popular, especially among thoughtful persons, and have gone through more than 20 editions. In 1808, F. married the lady to whom his essays were originally addressed, and retired to Bourton-on-the-Water, Gloucestershire, where he lived a quiet, studious, literary life, preaching, however, in the villages near on Sundays. In 1819 appeared his celebrated *Essay on the Evils of Popular Ignorance*, in which he urges the necessity of a national system of education. He was long the principal writer in the *Electric Review*, and a selection from his contributions to that magazine was published by Dr. Price 1844. He died at Stapleton, near Bristol. F. was a man of deep but somber piety. The shadows that overhung his soul were, however, those of an inborn melancholy, and had nothing in common with the repulsive gloom of bigotry or fanaticism. His thinking is rugged, massive, and original; and at times, when his great imagination rouses itself from sleep, a splendor of illustration breaks over his pages that startles the reader both by its beauty and its suggestiveness. Besides the works already mentioned, F. published several others, of which the most important is an *Introductory Essay to Doddridges' Rise and Progress of Religion* (1815). Compare the *Life and Correspondence* of F. (2 vols. 1846), edited by J. E. Ryland, republished in Bohn's Standard Library 1852.

FOS'TER, JOHN GRAY: 1823, May 27—1874, Sep. 2; b. Whitefield, N. H.: U. S. army officer. He graduated at the U. S. Milit. Acad. and entered the army as second lieut. of engineers 1846; took part with a co. of sappers and miners in the siege of Vera Cruz and the battles of Contreras, Churubusco, and Molino del Rey, where he was wounded, 1847-8; was brevetted first lieut. and cap. for services in Mexico, engaged on fortification and coast-survey duty 1848-54; asst. prof. of engineering at the U. S. Milit. Acad. 1855-57, on construction duty at Forts Sumter and Moultrie, S. C., 1857-61; assisted Maj. Anderson in transferring the garrison of Fort Moultrie to Sumter 1860, Dec. 26-7; was brevetted maj. for this service, and was present through the bombardment of Sumter. In 1861, Oct., he was appointed brig. gen. of vols. and ordered on duty with Gen. Burnside's expedition to N. C., and gained the brevet of lieut. col. for engineering services at Roanoke Island. He was promoted maj. gen. of vols. 1862, July, and assigned to command the dept of N. C., conducted several important expeditions, was in command of depts. of Va. and N. C. 1863, July-Nov., and subsequently of O. and the South; was brevetted brig. gen. U. S. army for services at capture of Savannah, and maj. gen. for field services through the war, and was mustered out of the vol. service

FOSTER.

1866, Sep. He commanded the dept. of Fla. 1865-6, and afterward became superintending engineer of river and harbor improvement.

FOSTER, JOHN WATSON: soldier and diplomat: 1836, Mar. 2— ————; b. Pike.co., Ind. He was graduated at the State Univ. of Ind. 1855; studied at Harvard Law School 1855-6, was admitted to the bar 1857, and practiced at Evansville, Ind., until the breaking out of the civil war, when he entered the Union army as major of the 25th Ind. Vols., becoming col. of an Ind. regiment; served under Grant and Sherman in the west. After the war he edited the *Evansville Journal* until 1873, when he was appointed minister to Mexico by Pres. Grant; was reappointed to that post 1880 by Pres. Hayes, who (1881) transferred him to Russia. This mission he soon resigned to become counsel for some of the foreign legations in Washington. Pres. Arthur appointed him minister to Spain 1883. After negotiating a commercial treaty he resigned, 1885, but was returned on a special mission, concerning the treaty, by Pres. Cleveland. Pres. Harrison commissioned him 1891 to negotiate treaties of reciprocity with Spain, Germany, and San Domingo; he acted as agent of the United States in the Bering Sea arbitration with Great Britain; succeeded Mr. Blaine as secretary of state 1892; represented the United States in the Bering Sea arbitration 1893; and was called to China 1895 to act as adviser of Li Hung Chang in making peace with Japan.

FOSTER, JOHN WELLS: geologist: 1815, Mar. 4—1873, June 29; b. Brimfield, Mass. He completed the scientific course at Wesleyan Univ. 1834, and was admitted to the Zanesville, O., bar 1835; assisted in a geological survey of Ohio 1837, and was occupied with this work until 1844, when he returned to Mass. and engaged in civil engineering. In 1847 he was appointed by the U. S. govt. to assist in a geological survey of the Lake Superior region, his reports first clearly establishing the richness of that mineral region. Afterward he returned to Mass. and helped to organize the 'Native American' party, from which he subsequently withdrew because he differed from them on the slavery question, and became active in the formation of the republican party. He spent much time in archeological study in the Mississippi valley; was for some time pres. of the Chicago Academy of Sciences, and was pres. of the American Association for the Advancement of Science 1869.

FOSTER, STEPHEN COLLINS: composer of popular songs: 1826, July 4—1864, Jan. 13; b. Pittsburg, Penn. He was educated at Athens Acad. and Jefferson Coll., Penn., and afterward learned French, German, music, and painting. He wrote nearly 200 songs, in most cases both words and music, and nearly all of them became popular. His first song was *Open Thy Lattice, Love* (1842); his last was *Beautiful Dreamer* (1864). Among his songs are: *Old Folks at Home*, *Nelly was a Lady*, *Old Dog Tray*, *Old Uncle Ned*, and *Willie, We Have Missed You*.

FOSTER—FOUCAULT.

FOS'TER, LAFAYETTE SABINE, LL.D.: 1806, Nov. 22—1880, Sep. 19; b. Franklin, Conn.: statesman and jurist. He graduated at Brown Univ. 1828, was admitted to the bar 1831, was speaker of the Conn. house of representatives 1847, 48, 54; mayor of Norwich 1851–53; U. S. Senator 1854–67, pres. *pro tem.* of the senate 1865, and acting vice-pres. of the United States 1865, Apr.—1867, Mar. In 1869, he was offered and declined the office of prof. of law in Yale Univ., and 1870 was again elected speaker of the Conn. assembly, and also elected judge of the Conn. supreme court of errors and the superior court.

FOS'TER, RANDOLPH SINKS, D.D.: Bishop of the Meth. Episc. Church: b. Williamsburg, O., 1820, Feb. 12. He received a collegiate education; became an itinerant minister of the Meth. Episc. Church 1837; held pastorates in the west till 1850, and was then transferred to the New York conference; preached in New York and Brooklyn till 1856, was pres. of Northwestern Univ., Evanston, Ill. 1856–60; elected prof. of systematic theol. in Drew Theol. Seminary 1868; appointed pres. 1870; and elected bp. 1872; D. 1903.

FOSTORIA: city of Seneca co., O. It has 5 trunk-line railroads, and is contiguous to a large oil and gas district. Manufactories are supplied by the city with natural gas practically free. There are 7 glass factories, and the Harter Mills turn out about 1,500 bbls. of flour daily, shipping largely to Europe; the Cadwallader Milling Co. also has large capacity. There are buggy, barrel, stave, and box factories, planing-mills, 3 banks, daily and weekly newspapers, and 7 public-school buildings. Aggregate value of manufactures, \$3,500,000. Pop. (1880) 3,569; (1890) 7,640; (1900) 7,720.

FOTHER, n. *föth'ér* [Low Ger. *foder*; Dut. *voeder*; Ger. *fuder*, a wagon-load]: a cart-load or large quantity; a weight for lead of 2,400 lb. or 2,184 lb., but variable.

FOTHERGILL PROCESS, *föth'ér-gül prös'sës*: one of the numerous dry processes in photography (q.v.) which have for their object the preservation of sensitive plates ready for exposure. It is named after the inventor; and consists in the partial removal of the free nitrate of silver which adheres to the collodion film on withdrawing it from the sensitizing bath by washing with water, and the subsequent conversion of the remaining free nitrate of silver into albuminate and chloride of silver by pouring over the plate dilute albumen, containing chloride of ammonium, the excess of albumen being finally washed off by violent agitation with a copious supply of water. The plates being set aside to drain on folds of blotting-paper, are, when dry, ready for use. For details of manipulation, see hand-books of photography.

FOUCAULT, *fô-kô'*, JEAN BERNARD LÉON: 1819, Sep. 18—1868, Feb. 13; b. Paris: natural philosopher. He began studying medicine but soon abandoned it for physical science, and directed his attention to optics with a view to improving Daguerre's photographic processes. He spent three years as experimental asst. to Prof. Donné while lec-

FOUCAULT'S PENDULUM—FOUCHÉ.

turing on microscopic anatomy, and invented an electric lamp which has been extensively used in physical experiments and for illuminating purposes 1844. In conjunction with Hippolyte Fizeau he conducted a series of experiments on the phenomena of light, and demonstrated that its velocity differs materially while passing through a vacuum or through transparent bodies; and by means of a pendulum and his invention, the gyroscope, proved the diurnal motion of the earth and measured it. He received the Copley medal of the Royal Soc. of London 1855; invented the F. polarizer 1857; determined the absolute velocity of light 1862; was appointed physical asst. in the imperial observatory at Paris, and has been made a member of numerous learned societies.

FOUCAULT'S PENDULUM, *fó-kōz'* [from Jean Barnard Léon *Foucault*]: pendulum for rendering visible the diurnal motion of the earth: see EARTH.

FOUCHÉ, *fó'shā*, JOSEPH, Duke of Otranto: 1763, May 29—1820, Dec. 26; b. Nantes, France; son of a sea-captain. He was educated at the Oratoire. He hailed the revolution with enthusiasm, and in 1792 became a member of the national convention. He voted for the death of Louis XVI., and was one of the commissioners sent to Lyon 1794 to reduce that city to obedience. In 1795, he was expelled from the convention as a dangerous Terrorist, and kept in confinement for a short time. After the revolution of the 18th Brumaire (1799, Nov. 5), in which he took part, F., as minister of police organized an extraordinary police. He restrained the new government from deeds of violence, and by his advice the list of *émigrés* was closed, a general amnesty proclaimed, and the principle of moderation and conciliation steadily adhered to. His remark upon the execution of the Duke d'Enghien was very apt.: '*C'est bien pis qu'un crime, c'est une faute*' (It is much worse than a crime; it is a *blunder*). In 1809, the emperor conferred on him the title of the Duke of Otranto, with large grants from the revenues of the Neapolitan territory. When the English expedition landed on Walcheren (1809), the emperor was absent, and F., who then held the portfolio of the interior, as well as of the police, organized the measures that led to the retirement of the English. In a proclamation, he made use of a boastful expression which lost him the favor of Napoleon, and in the following year he was forced to resign. In the campaign of 1813, the emperor summoned F. to be headquarters at Dresden, and sent him thence as gov. of the Illyrian provinces, and after the battle of Leipsic, to Rome and Naples, to keep a watch upon Murat's proceedings. Being recalled to Paris in the spring of 1814, he predicted the downfall of Napoleon even before his arrival in France. After the emperor's abdication, F. advised him to abandon Europe altogether. On his return from Elba, Napoleon again nominated him minister of police; but after the battle of Waterloo, F. placed himself at the head of the provisional govt., brought about the capitulation of Paris, and drew back the army behind the Loire, thereby

FOUGADE—FOUL.

preventing unnecessary bloodshed. At the Restoration, Louis XVIII. reappointed him minister of police; but he resigned his office in a few months, and went as ambassador to Dresden. The law of 1816, Jan. 12, banishing all those who had voted for the death of Louis XVI., was extended to F. also, who from that time resided in Austria. He died at Trieste, leaving an immense fortune. Napoleon, at St. Helena, called F. 'a miscerant of all colors;' and Bourrienne declares that he 'never regarded a benefit in any other light than as a means of injuring his benefactor'—specimens of exaggeration. The truth appears to be, that F. was a man whose highest principle was self-interest, but whose sagacity was not less conspicuous, and who never failed to give the governments which he served the soundest political advice. It is true, however, that he was unscrupulous in passing from one party to another, and that he was as destitute of political morality as Napoleon himself. In his private relations, his character was good. In 1824, appeared a work entitled *Mémoires de Fouché, duc d'Otrante*, edited by A. Beauchamp, which, though declared spurious by the sons of F., is generally held to have been based on genuine documents.

FOUGADE, n. *fû-gād'*, or FOUASSE, n. *fû-gās'* [F. *fougade*—from *fougue*, heat, fury]: a small mine made under an enemy's fortification, and charged with powder.

FOUGÈRES, *fó-zhâr'*: handsome town of France, dept. of Ille-et-Vilaine, on a hill on the right bank of the Couesnon, 28 m. n.e. of Rennes. It is well-built, with wide streets, and in the old quarter retains traces of the middle ages in the ancient arcades which still obtrude in some places upon the streets. The castle of F. is picturesque but being commanded by other parts of the town, forms but a feeble defense. In the neighborhood is a great forest containing Druidical remains. A famous battle took place here between the Vendean royalists and the Republicans, 1793, Nov. 15. F. has dye-works, manufactures of sail-cloth, canvas, flannel, hats, leather, and boots: and near it are glass and paper-works. Pop. (1891) 18,221.

FOUGHT, *fawt*: see under FIGHT.

FOUL, a. *fowl* [Goth. *fuls*; Icel. *full*, stinking, corrupt: Ger. *faul*, foul: AS. *fulan*, to corrupt: comp. Gael. *fual*, urine; *foill*, deceit]: not clean; offensive; dirty; coarse; disgraceful; rainy or tempestuous—applied to weather; contrary, as a wind; entangled; dangerous; ugly; false; unfair: V. to make filthy; to defile; to run against. FOUL'ING, imp. FOULED, pp. *fowld*. FOUL'LY, ad. *-lī*, scandalously; disgracefully; not fairly or honestly. FOUL'NESS, n. filthiness; defilement. FOUL-FACED, *-fāst*, having an ugly or forbidding aspect. FOUL-FEEDING, living on unclean or gross food. FOUL-MOUTHED, using scurrilous, obscene, or profane language. FOUL-PLAY, unlawful, dishonest means; unfair or treacherous usage. FOUL-SPOKEN, nasty in language. TO FALL OR RUN FOUL OF, to assail; to run against. A FOUL, the act of one boat running against another in a race.

FOULA—FOULARD.

FOULA, or **FOULAH**, *fow'la*: island of Shetland, parish of Walls, from which it is 20 m. west; length 3 m., breadth $1\frac{1}{2}$. It rises to a height of 1,369 ft. above the sea. It is solitary, and has no regular communication with the mainland or larger islands. Its inhabitants subsist by fishing and farming on a small scale. On the island, is a school maintained by the Soc. for Propagating Christian Knowledge; also a chapel connected with the Church of Scotland, and a chapel with a missionary maintained by the Congl. Union of Scotland. F. is remarkable chiefly for its sublime cliffs of red sandstone on its n.w. side, where the precipice rises from the sea-margin nearly 1,200 ft., being the grandest headland in the British Islands. Among the sea-birds which occupy the cliffs in the Skua Gull, or Bonxie (*Lestris cataractes*).

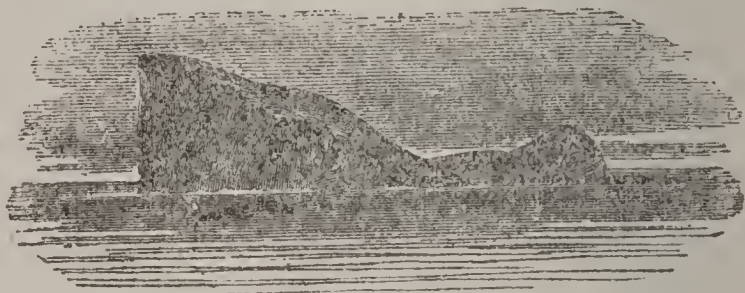


Fig. 1.—General Appearance of Foula from the Sea.

Of this powerful bird there are about 13 pairs, prized by the natives for their services in keeping down the numbers of the eagles on the cliffs. The landing-place on F. is at a scattered hamlet of wretched thatched huts on the south-east. Here is a store, at which imported commodities are



Fig. 2.—A Foula Hut.

bartered for fish and other articles, and at which an apartment is let to strangers, there being no inn. F., however, is rarely visited, and little is known of it even in Scotland. Pop. abt. 270.

FOULAHS: see **FULAHS**.

FOULARD, n. *fô-lârd'* [*F. foulard*, a silk handkerchief]: a light material of silk or silk-cotton, for ladies' dresses and handkerchiefs, originally from India.

FOULD—FOULIS.

FOULD *fɔʊld* **ACHILLE**: 1800, Oct. 31—1867; b. Paris. He was educated at the Lycée Charlemagne, one of the most celebrated establishments of Paris. He originally belonged to the Jewish creed, his family being wealthy Jew bankers, but he adopted the Prot. faith. Early in life, he was initiated into financial transactions by his father, and his natural talents were developed by travel in Europe and the East. In 1842, he began his political career, being then chosen as a member of the council-gen. of the Hautes Pyrénées, and elected a deputy for Tarbes, chief town of that department. In the chamber of deputies he showed peculiar talent for questions of finance and political economy. At that period he was a stanch supporter of M. Guizot's home and foreign policy. After the revolution of 1848, F. accepted the new régime of the republic, and offered his services to the provisional government. In 1848, July, he was elected representative for the dept. of the Seine. During the presidency of Louis Napoleon, F. was four times minister of finance, and repeated resignations for state reasons did not prevent him from being again appointed on the occasion of the *coup d'état*, 1851, Dec. 2. He once more resigned his position Jan. 25 following, in consequence of the decree ordering confiscation of the property of the Orleans family. The same day, however, he was created a senator, and shortly afterward returned to power as minister of state. In this capacity, he superintended the Universal Paris Exhibition 1855, the completion of the palace of the Louvre, and other great measures. He remained one of the most confidential ministers of Napoleon III. till 1850, Dec., when he was succeeded as minister of state by Comte Walewsky. He was out of office till 1861, Nov., at which date he was reappointed finance minister, his long experience and well-known ability as a financier pointing him out as the man to manage the crisis of the French finances at that time.

FOULDER, n. *fowl'dər* [OF. *foldre*, or *fouldre*, a thunderbolt—from L. *fulgūr*, a thunderbolt; *fulgūra*, thunderbolts]: in *OE.*, lightning: V. to emit great heat. **FOULDERING**, a. burning.

FOUL IN THE FOOT: disease affecting cattle and sheep; distinct from foot-rot (q.v.). It appears around the hoof, usually between the claws, and is marked by inflammation, swelling, and the formation of ulcerous sores, causing severe pain, lameness, and if neglected, loss of flesh and general ill-health. It is produced by standing in mud or water, or on fermenting manure. Treatment: Remove at once to clean quarters; thoroughly cleanse the affected parts, wash with castile soap and warm water, and apply spirits of turpentine, or carbolic acid diluted with eight times its bulk of water. In severe cases apply finely pulverized bloodroot and alum, in equal quantities.

FOULIS, *fow'lis*, **ROBERT** and **ANDREW**: eminent printers of Glasgow, brothers, whose names are usually classed together.

ROBERT, the elder (1707, Apr. 20—1776; b. Glasgow) was

FOUMART—FOUND.

bred as a barber—in those days of flowing periwigs, a profitable and respectable business. In winter, he and his brother ANDREW (1712, Nov. 23—1775, Sep. 18) employed themselves in teaching languages; and in summer, they made short excursions to the continent, and acquired considerable knowledge. In 1727, Andrew entered as a student at the Univ. of Glasgow. About the end of 1739, Robert began business in Glasgow as a printer, his first publications being chiefly religious. In 1742, he published an elegant edition in 4to of *Demetrius Phalereus on Elocution*, supposed to be the first Greek work printed in Glasgow. In 1743, he was appointed printer to the university. In 1744, he brought out his celebrated immaculate edition of Horace, 12mo, each printed sheet of which was hung up in the college of Glasgow, and a reward offered for the discovery of any inaccuracy. Soon afterward he took his brother Andrew into partnership; and for 30 years they continued to bring out some of the finest specimens of correct and elegant printing, particularly in the Latin and Greek classics, which the 18th c. produced, either in Britain or on the continent. To promote the fine arts in Scotland, Robert, after a two years' visit to the continent in preparation, commenced, 1753, an academy at Glasgow, for instruction of youth in painting and sculpture: the expense attending this institution led to the decline of the printing business, which, however, continued more than 20 years longer.

FOUMART, n. *fó'márt*, and FOULMART, n. *fól'márt* [as if from *foul* and *mart*, expressing the bad smell from the animal, but really a corruption of F. *fouine*, the polecat, and Eng. *marte*, or *marten*]: the marten; commonly applied to the polecat.

FOUND, pp.: see under FIND.

FOUND, v. *fownd* [F. *fonder*, to found—from L. *fun*, *dārē*, to lay the bottom, to found—from L. *fundus*; F. *fond*—the bottom: It. *fondare*: comp. Gael. *fonn*, the ground, the land]: to establish on firm ground; to lay the basis of anything; to set up; to raise; to institute; to fix firmly; to originate. FOUND'ING, imp.: see FOUNDING, or METAL CASTING. FOUND'ED, pp. FOUN'DER, n. one who establishes; an originator. FOUNDATION, n. *fown-dā'shūn*, the base of an edifice or building; the act of fixing or making such a base (see below): the groundwork or origin of anything; an endowment; an institution. FOUNDATIONER, n. one who derives support from the foundation or endowment of a college, school, or other institution. FOUNDATION-MUSLIN, open worked, gummed fabric used for stiffening dresses and bonnets. FOUNDATION-SACRIFICE, in *compar. myth.*, sacrifice usual with many barbarous races, who sought to render buildings firm by drenching the foundation stones with blood, by burying a human victim beneath them, or by immuring in the wall itself a living victim. Tradition ascribes such sacrifices in the middle ages, to the builders of the castle of Liebenstein in Thuringia, of the walls of Copenhagen, and of Scutari. The custom lingers

FOUND—FOUNDATION.

in parts of Asia and Africa, and in Polynesia and Bornea. FOUNDATION-SCHOOL, school supported by an endowment; an endowed school. FOUN'DRESS, n. a woman who originates or establishes. ON THE FOUNDATION, that has an interest and share in an endowment, as a scholar or fellow of a college.—SYN. of 'found': to establish; set; place; base; ground; originate; predicate; build; rest.

FOUND, v. *fownd* [F. *fondre*, to melt—from L. *fundĕrĕ*, to pour out: It. *fondere*]: to form by melting a metal, and casting it into a mold. FOUND'ING, imp.: N. the act of casting or forming with melted metal in a mold. FOUND'ED, pp. FOUNDER, n. *fown'dĕr*, one who is skilled in forming articles by casting metal in molds. FOUNDERY, n. *fown'dĕr-ĭ*, or FOUNDRY, n. *fown'drĭ*, the place where casting liquid metal into molds to produce articles of various designs is carried on: see FOUNDLING.

FOUND'A'TION, in Construction: either the natural surface or bed on which a building rests; or the lower part of the building which rests on the natural bed.—1. F. as the *bed*. The best is solid rock, or any kind of resisting incompressible stratum, free from water. Where there is no chance of water, sand forms a solid foundation. When the soil is soft, loose, and shifting, a solid bearing can be obtained only by driving *piles* or long beams of wood, sharpened at the end, through the soft soil, till they reach a hard bottom. This is then planked or laid with cross-beams, on which the superstructure is built. The piers of many bridges are formed in this manner. Where the soil is soft, but not shifting, as in the case of made or deposited earth, the method of *Concreting* (q.v.) is adopted—i.e., a large surface is laid with broken metal or gravel, and run together with hot lime, so as to form a broad solid artificial rock, on which the building may rest.—2. F. as the base of building. The broader and larger the lower courses of the mason-work, the stronger the wall. The stones should, if possible, extend through and through, and project on each side of the wall.

In the best periods of art, the foundations have always been most attentively considered. The Romans formed solid bearings of concrete as above described, and gave great attention to secure the stability of their buildings. In the dark ages, when there was want of knowledge combined with want of materials and means, many buildings fell from the yielding of the F. Some of the earlier Gothic buildings also suffered from the same cause. But knowledge came with experience, and the foundations of the later Gothic buildings, during the 14th and 15th c., were built with extreme care, and on the virgin soil—the stones being as finely dressed as those above ground, where necessary to resist a strong thrust. And where the weight is thrown unequally on piers and walls, these detached points are all carefully united below the floor with a network of solid walls.

Bad foundations accepted because of the cost of making a good F. on unfavorable ground, have been the cause

FOUNDER.

of the ruin of many modern buildings. It is good economy to spare no expense to make the foundation good.

FOUNDER, *v.* *foun'dér* [F. *fondre*, to melt—from L. *fundēre*, to pour out]: to fill or be filled with water and to sink in consequence, as a ship in the sea; to disable or lame a horse by causing sores in its feet or legs; to trip or fall, as a horse FOUN'DERING, *imp.* FOUN'DERED, *pp.* *-derd*: ADJ. sunk in the sea, as a ship; made lame in the feet by inflammation, etc. *Note.*—Perhaps from OF. *fondrer* (as in F. *effondrer*, to fall down to bottom), to sink in, as if from F. *fond*, L. *fundus*, the bottom.—See SKEAT.

FOUNDER, or LAMINITIS: inflammation of the laminæ of the foot, frequent among horses, rare in cattle or sheep. Horses with very small, or with large and flat feet are peculiarly susceptible to this disease, and heavy horses more than light ones. In acute cases there is a high degree of fever in the affected feet, severe lameness, intense pain, and the exudation of lymph or blood between the sensitive and horny laminæ. It affects the fore feet more frequently than the hind ones, and sometimes extends to the muscles of the fore legs and chest, and closely resembles rheumatism. F. may result from a variety of causes, such as over-driving or overloading, exposure to cold air, or drinking cold water when heated or exhausted, disturbance of the digestive organs from improper feeding, disease of the lungs, or bad shoeing. In acute cases prompt treatment is demanded. The shoes must be removed, a deep bed of straw provided and the horse encouraged to lie down, in order to relieve the pressure on the feet. A laxative may be immediately administered. Every four or five hours 20 drops of tincture of aconite should be given in a little water until six doses have been taken or relief obtained. The feet should either be poulticed with bran or the hydropathic method of packing adopted. In the latter case the feet should be thoroughly washed, a sponge fitted for a cushion for each foot should be saturated with tincture of arnica and water (in the proportion of eight ounces of the former to a gallon of the latter), and kept in place on the sole of the foot by ample bandages, which also should be saturated with the mixture. These bandages should be kept constantly moist and remain on for several days. Food should consist of mash, roots, and grass or hay. Water should be given frequently, and a little cream of tartar may be added if thirst is intense. When the inflammation subsides the hoof should be thinned with a rasp. If in summer, the horse should be turned into a pasture for a few weeks, but must be sheltered from storms. The stable floor should be deeply covered with earth or other soft material. Chronic cases of F. are seldom or never cured, but may be greatly relieved by placing a cushion of leather or rubber, well covered with tar or oil, between the shoe and the hoof, frequent oiling of the hoof, and furnishing some soft material upon which to stand when the horse is in the stable. Preventive measures are far more successful than attempts to cure. Wherever possible F. should be treated by a competent veterinarian.

FOUNDING.

FOUND'ING, or **MET'AL-CAST'ING**: art of obtaining casts of any desired object by pouring melted metal into molds prepared for the purpose. It has risen to great importance in recent times, on account of the many new applications of iron. Iron-founding, brass-founding, type-founding, as well as casting in bronze and zinc, are the principal divisions of the art. Casting of finer metals and alloys, as gold, silver, and German silver, is conducted on a smaller scale.

When the casting of an object is required, it is necessary, in the first place, to make a pattern. Suppose it to be a plain round iron pillar, on which a gate is to be hung. A pattern of this is turned in some wood which can be readily made smooth on the surface, such as pine, and then varnished or painted so as to come freely out of the mold. This wooden pillar, or any similar pattern, is always made in at least two pieces, the division being lengthwise, for a reason which we shall presently see. The next step is to prepare the mold. The molds used by the iron-founder are either of sand or loam, but generally of fine sand. Proceeding with the preparation of the mold, the founder takes a moulding box, which is composed of two open iron frames with cross-bars, the one fitting exactly on the other, by means of pins in the upper, dropping into holes in the lower frame. One-half of the box is first filled with damp sand, and the pattern laid upon it, a little dry *parting sand* being sprinkled on the surface. The upper half of the box is then put on, and sand firmly rammed all round the pattern. The box is then carefully opened, and, when the pattern is removed, its impression is left in the sand. The mold at this stage, however, is generally rough and broken. It is necessary, therefore, to give it a better finish, which is done by taking each half of the mould separately, repairing it with a small trowel, and re-introducing the corresponding half of the pattern till the impression is firm and perfect. Finally, the surface of the mold is coated with charecoal-dust, which gives a smooth surface to the future-casting. These columns being made hollow, there is yet another matter to arrange before the casting can be made—namely, the *core*. In the instance before us, it would be simply a rod of iron, covered with straw and loam to whatever thickness the internal diameter of the column happened to require. The core of course occupies the centre of the mold.

The cast iron is melted with coke in a round fire-brick, furnace, called a *cupola*, the heat being urged by means of a powerful blast, created by fanners revolving at high speed. The molten metal is run from a tap at the bottom of the furnace into a malleable iron ladle, lined with clay, from which it is poured into the mold through holes called *runners* or *gates*. When the mold is newly filled, numerous jets of blue flame issue from as many small holes pierced in the sand. These perforations are necessary for the escape of air and other gases produced by the action of the hot metal on the mold. Care must also be taken not to have the mold too damp, otherwise steam is generated, which may cause holes in the casting, and even force part

FOUNDING.

of the metal out of the mold. The casting remains covered up for a time, in order to cool slowly, and is then removed by breaking away the sand, and drawing out the core. In the case of a fluted, or otherwise ornamented pillar, the pattern would require to be in at least four pieces instead of two, because it is only a plain pattern that will come out of the mold in halves without tearing away the sand. When a pattern is necessarily made in several pieces, it is drawn out of the mold bit by bit, to the right or left, as the case may be, and so parts from the sand without breaking it. If a small ornamental vase was to surmount the pillar, the founder would prepare the pattern of this in a more elaborate manner. He would first mold it in wax or clay, from which a cast in plaster of Paris is made; from that a cast is taken in an alloy of tin and lead, which, after being sharply chased, and divided into the required number of pieces, is used as a pattern to cast from. All ornamental patterns, such as figures, scrolls, leaves, enriched moldings, and the like, are made in this way, whatever metal the ultimate casting is to be produced in. Very large engine cylinders, pans, and such vessels, are cast in loam-molds, which are built of brick plastered with loam, then coated with coal-dust, and finally dried by means of a fire. This method is adopted with large plain objects, where a pattern would be expensive, and when few castings of one kind are required. Iron molds, coated with black-lead or plumbago, have recently been introduced for casting pipes into: they are greatly more expensive than any other kind, but they enable the founder to dispense with a pattern, as, when once made into the required form, they are not destroyed like molds of sand or loam at each casting. Bronze and brass are cast in molds prepared with finer sand than that used for iron. Pewter and similar soft metallic alloys are cast in brass molds. The type-founder uses molds of steel, now worked to a great extent by a machine.

The variety of articles produced by founding or casting is very great, e g. cylinders, cisterns, paper-engines, beams, boilers, pumps, and heavy parts of machinery generally, gates, railings, lamps, grates, fenders, cooking-vessels, and the like, in iron: cannon, many portions of machinery, and numerous ornamental objects, in brass: sculpture and other works of art in bronze and the more costly metals. One of the remarkable castings for the requirements of modern engineering, was the cylinder of the hydraulic press used for raising the tubes of the Britannia Bridge. It measured 9 ft. \times 3 ft. 6 inches, the metal being 10 inches thick, and weighed more than 20 tons. It remained red hot for three days, and it was seven days more before men could approach it to remove the sand. Sole plates for steam-hammers, and for other purposes, have been cast more than double this weight, but the same care was not required in their execution. In regard to sculpture, perhaps the most wonderful casting known is the colossal statue of Bavaria at Munich, finished 1850, 54 ft. high, the length of the face being equal to the height of a man. It took eight years to cast, and the cost of the bronze used, was about \$50,000.

FOUNDLING—FOUNDLING HOSPITAL.

FOUNDLING, n. *found'ling* [Dut. *vondeeling*, a foundling (see FIND)]: a child found without a parent or owner; one whose parents are unknown.

FOUNDLING HOSPITAL: establishment in which children abandoned by their parents and found by others, are nurtured at public expense. Among ancient nations, such institutions were known, though as the law usually placed the power of life and death in the hands of the father, and permitted him to sell his children into slavery, it is probable that infanticide, as among eastern nations at the present day, was the usual mode of solving the difficulty which foundling hospitals are intended to meet. Desertion, however, and exposure, being less atrocious, were more frequent; and to meet these, the reception and education of foundlings were enjoined on private persons, to whom they were assigned in property. When this means of support failed, they were protected by the state. The Egyptians and Thebans are praised by the classical historians for discouraging the exposure of infants. The practice of exposing infants probably prevailed even among the Germanic nations previous to the introduction of Christianity; and though Tacitus says that infanticide was forbidden, it is said to have reached a fearful height, in Iceland in particular. From the period at which Christianity became the state religion of the Roman empire, a sensible change in the spirit of legislation on the subjects both of infanticide and exposure is apparent; and though the latter is spoken of by Gibbon as one of the most stubborn remnants of heathendom, it gradually gave way, and the Christian Church, at a very early period, encouraged the establishment of foundling hospitals. So early as the 6th c., a species of F. H. is said to have existed at Treves. The bishop permitted the children to be deposited in a marble basin which stood before the cathedral, and gave them in charge to members of the church. But the first well-authenticated one is that of Milan, established 787, probably in obedience to the 70th article of the Council of Nice, which enjoined that a house should be established in each town for the reception of children abandoned by their parents. It is probable, however, that foundling hospitals existed extensively at an earlier period, as mention is made of them in the capitularies of the Frankish kings. In 1070, a F. H. was established in Montpellier; in 1200, Einbeck; in 1212, Rome; in Florence, 1317; in Nürnberg, 1333; in Paris, 1362; in Vienna, 1380. In France, the utility of these establishments, which were the special labor of Vincent de Paul (q.v.) was early called in question; and letters-patent of Charles VII., 1445, affirmed that 'many persons would make less difficulty in abandoning themselves to sin when they saw that they were not to have the charge of the upbringing of their infants.' In Germany, the system of foundling hospitals was soon abandoned, the duty of rearing the children being, as in England, imposed by law, first on the parents, then on more distant relatives, whom failing, on the parish, and last of all, on the state. The reproach made by Rom. Cath. countries against this more

FOUNDLING HOSPITAL.

natural arrangement—that it tends to promote infanticide—is said to have been in no degree established by statistical investigations. The revolutionary government of France not only adopted the system of foundling hospitals handed down to it, but in 1790 declared all children found to be children of the state (*enfants de la patrie*). Nay, as a still further premium on immorality, it declared that every girl who should declare her pregnancy should receive a premium of 120 francs! The imperial government, 1811, abolished this insane enactment, but continued and further systematized the arrangement by which the foundling hospitals had become government establishments, and the children, children of the state. This state of things remained unaltered till recently, and every considerable town had its F. H. and turning-wheel. The expense of rearing a child to the age of 12 in the hospital at Paris was computed at 952 francs 42 centimes, or somewhat less than \$200. The moment that the child was received it was weighed, and if its weight was less than six pounds, it was considered that its chance to live was very small. It was then inscribed in a register, and a formal statement was drawn up of any name which had been given along with it, or of any particular mark which it bore either on its person or otherwise; of the hour at which it was deposited, its sex and its dress. It was then inspected by a medical man, and handed over to the nurses. At Paris, each child was committed to a special nurse, many of whom were retained on the premises, and paid 40 centimes a day. Other nurses were brought in from the country in carriages kept by the hospital, which returned conveying the children with their new mothers. The children thus boarded out were inspected twice a year by local medical men appointed for the purpose. The parents and relations were permitted to reclaim them at any period, or they might be legally adopted by any French citizen in a condition to maintain them. A large proportion of the children were not proper foundlings, but orphans and infants abandoned by parents unable or unwilling to bear the expense of their maintenance; and the mothers were known in many instances by offering themselves as nurses to get charge of their own infants. The question of the propriety of encouraging secrecy by the use of the turning-box, or of causing the parents openly to deposit the children in the hands of an officer, was long discussed with much keenness in France. The argument in favor of the turning-box was that by which the whole institution was defended, viz., that it tended to discourage infanticide. But even if that were unquestionable, there were many other obvious considerations to be taken into account, and these have preponderated. An official report by M. Gasparin, 1837, showed that the number of children exposed had increased between 1811–33, from 70,000 to 130,000; that the infant mortality was appalling; and that those who survived, ushered into the world without friends or means, constituted a large proportion of the thieves and prostitutes of the country. Within the last 30 years the

FOUNT--FOUNTAIN.

whole system has been greatly modified, the changes being in the direction recommended in M. Gasparin's report. A large number of hospitals have been suppressed. The turning-box has been abolished, or, where retained, placed under such restrictions as make the abandonment public; the officers of the hospital, on receiving the infants, make full inquiry into the position and residence of the mother. The new-born infants have a separate department assigned them, and assistance is given at their own dwellings to mothers in circumstances to require it. The very name of 'enfants trouvés' has been exchanged for 'enfants assistés.' The result has been a vast diminution of the number of exposures, and a great saving of expense to the country, and lessening of mortality among the infants. The present number of foundling hospitals in France is believed to be about 130. In Spain they number about 70. Portugal, Belgium, Austria, and Norway possess foundling hospitals; and those of Moscow and St. Petersburg are among the largest in the world.

The F. H. in London was established by Captain Thomas Coram, a benevolent sailor, 1739. The system of foundling hospitals never having been approved in England, the London hospital was changed 1760 to what it now is—a hospital for poor illegitimate children whose mothers are known. The committee, previous to admitting the child, must be satisfied of the previous good character and present necessity of the mother. The qualification for a governor is a donation of £50. The great Handel was one of the chief benefactors of the hospital. He endowed it with a magnificent organ, and frequently performed his oratorio of the *Messiah* in the chapel, which is still celebrated for its music. Though every attention is paid to the health and comfort of the children at the Foundling—to such an extent, indeed, as very often to unfit them for the hardships which many of them must encounter in after-life—the physician makes the statement that they do not attain the height of average English men and women. Foundling hospitals exist in Mexico, and in almost all the states of S. America; in the United States there are some supported mainly by private charity.

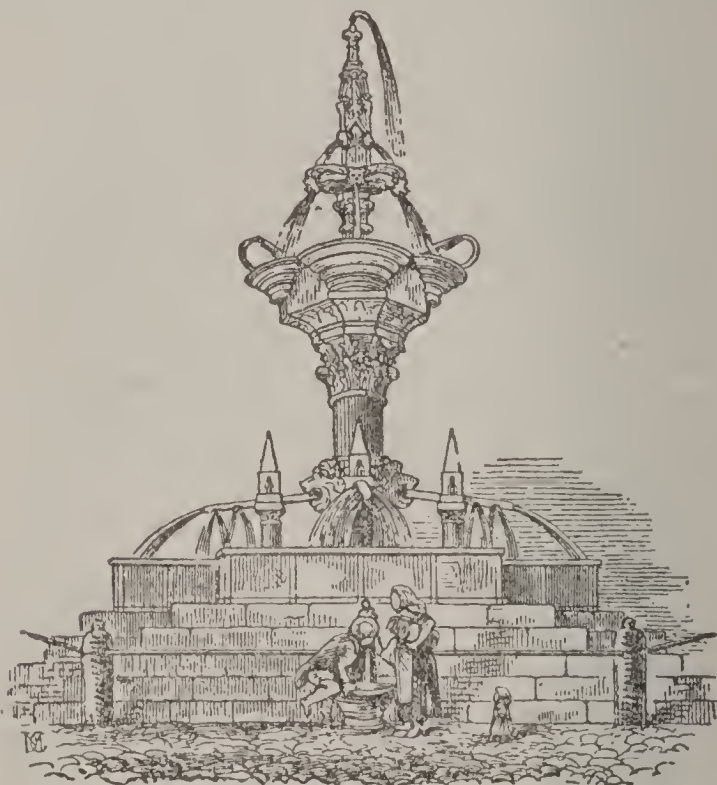
FOUNT, *n.* *fount*, or FOUNTAIN, *n.* *foun'tān* [*F. fontaine*—from *mid. L. fontānă*—from *L. fontēm*, a spring of water: *OF. funt*, or *font*, a fountain]: a spring of water issuing from the earth; a spring; a well of water: a jet or spouting of water—generally applied to one artificially contrived; the source of anything; in *heraldic emblem*, a round ball having wavy stripes of blue and white, like bars. FOUN'TAINLESS, *a.* without a fountain or spring. FOUN'TAIN-HEAD, *n.* primary source; first beginning. FOUNTAIN OF YOUTH, in *myth.*, a fountain, by bathing in which, or, in the opinion of the Hindus, even by seeing it, one can become young again.

FOUNT: in *printing*, same as FONT 2, which see.

FOUNTAIN, or FOUNT: basin or jet for the supply of fresh running water. There are fountains of every form and variety, from the simple spring with its natural basin,

FOUNTAIN.

to the most elaborate and ornamental structure for the display or supply of water. In all ages, fountains have been considered as public monuments of the greatest importance; and where the source for their supply has not been provided by nature on the spot, immense labor and expenditure have often been incurred to make up for the deficiency. The splendid Aqueducts (q. v.) of the Romans are instances of the important light in which they regarded the fountains of their cities. Every Roman town had at least one aqueduct, the water from which was distributed to as many fountains as the population required. Utility is the first object of a fountain, and though they frequently receive forms of great display and magnificence, the finest fountains are those where the water is the greatest ornament. In the middle ages, fountains of great beauty and variety of form were



Fontana Grande, Viterbo.

built, but the useful nature of the structure was never lost sight of. Sometimes a spring was arched over for protection, with a beautiful vault, and a statue of the patron saint in a niche, with a basin below to contain the water. In towns where many persons might require to draw at one time, a large basin was erected, with a pillar in the centre, from which pipes radiated all round—each with its separate jet to supply the running water—while the basin was used for washing the pitchers. Many examples of this kind remain. Below is represented a fountain at Viterbo, in the former Papal States, where are many of the same description. The pillar is sometimes surmounted by a statue, or has one or more smaller basins, with ornamental streams and jets of water falling from tier to tier. A beautiful fountain of this sort was in the royal palace at Linlithgow, Scot-

land, and a copy of it has been erected in front of Holyrood Palace.

In modern times, the French have excelled in magnificent fountains, those of Paris and Versailles being almost unrivalled. In England, the fountains at Chatsworth (q.v.) and those at the Crystal Palace are among the finest, and are remarkable for the great height to which the water is thrown. Although Rome has lost four-fifths of the aqueducts which so lavishly supplied her with fresh water in the times of the Empire, she is still unsurpassed for the number, beauty, and utility of the public fountains which adorn her streets and places.—Modern fountains are in most instances entirely ornamental. This arises from the modern mode of distributing water in pipes through the houses, making most street-fountains merely ornamental. Recently it has been found that town populations—both man and beast—require some public supplies of water, and for this service numerous drinking-fountains have been constructed in the principal towns. Many of these are elaborately ornamental, and are gifts of public-spirited citizens.

FOUQUÉ, *fô-kâ'*, FRIEDRICH HEINRICH KARL, Baron DE LA MOTTE: German author: 1777, Feb. 12—1843, Jan. 23; b. Brandenburg; grandson of the Prussian gen. of this name, distinguished in the Seven Years' War. F. served as Prussian officer in the campaigns of 1792 and 1813. The interval was given to literary pursuits in the country, and the rest of his life was spent alternately in Paris and on his estate at Nennhausen, and subsequently at Halle. He died in Berlin. F. appeared first under the name Pellegrin, as translator of Cervantes's *Numancia*, and author of some effusions in the spirit of Spanish poetry. But the Norse legends and old German poetry attracted him most strongly; as was evinced in numerous romances, in prose and verse, which picture the life of medieval Europe. Among the best known are *Sigurd, der Schlangentödter* (1809); *Der Zauberring*; *Die Fahrten Thiodolf's*; and *Undine*. Exhibiting many of the beauties of romantic school, he is chargeable with all its extravagances. Straining too often after fantastically unnatural conceits, he seems fascinated by the antique life which he pictures, rather from its quaint contrast with modern manners, than as a form into which the life of actually living men had shaped itself. He edited a selection of his works (*Auserwählte Werke*, 12 Bde., Halle 1841). F.'s first wife, KAROLINE VON BRIEST, also is known in Germany as a productive authoress.

FOUQUIERA, n. *fô-kê-â'ra* [named after Dr. Pierre Eloi Fouquier, prof. of medicine, in Paris]: typical genus of *Fouquieriaceæ*, tribe of *Tamariscaceæ*, distinguished by having large petals united into a tubular corolla. *Fouquieria formosa* is a showy shrub from Mexico, sometimes cultivated in green-houses.

FOUQUIER-TINVILLE, *fô-ke-â'tăng-vêl'*, ANTOINE QUENTIN: the notorious public accuser in the French Revolution: 1747–1795, May 7; b. in the village Hérouelles, dept. of Aisne. His early career was immoral, but insig-

FOUR—FOURDRINIER MACHINE.

nificant. On the outbreak of the Revolution, he figured as one of the fiercest democrats. By Robespierre, he was appointed, first a member, then director and public accuser, of the Revolutionary Tribunal. Without education, conscience, or sense of justice, he executed with brutal apathy, the bloody orders of the Committee of Public Safety. In reference to this feature of his character, his countrymen say that 'he had no soul—not even that of a tiger, which at least pretends to be pleased with what it devours.' Incapable of friendship, or of anything even remotely allied to generosity, he systematically abandoned his successive coadjutors in their hour of need, and sent to the scaffold, without the slightest compunction, Bailly and Vergniaud, Danton and Hebert, Robespierre and St. Just. He himself died by the guillotine in a cowardly manner.

FOUR, *n. a. fōr* [AS. *feower*; Goth. *fidvor*; Icel. *fjörir*; L. *quatūor*, four]: two and two. FOURSORE, *a. n. fōr-skōr* [*four*, and *score*]: four times twenty. FOUR'FOLD, *a. -fold* [*four*, and *fold*]: four times told; quadruple. FOUR'-TEEN, *n. a. -tēn* [*four*, and *ten*]: four and ten. FOUR'-TEENTH, *a. tēth*, ordinal of fourteen; the fourth after the tenth. FOURTH, *a. fōrth*, next after the third; ordinal of four. FOURTH'LY *ad. -li*, in the fourth place. FOURS, as in ON ALL-FOURS, that is, 'on the hands and feet'; in the same position; on equal terms. FOUR-COURSE, a rotation by which the same crop is made to recur at intervals of four years. FOUR-SQUARE, having four sides and four equal angles; quadrangular.

FOURCHAMBAULT, *fōr-shōng-bō'*: rapidly increasing town of France, dept. of Nièvre, five m. n.n.w. from Nevers, near the right bank of the Loire, here crossed by a suspension bridge. It is a station on the railway between Orleans and Nevers. There are great iron foundries, employing between 2,000 and 3,000 workmen. The manufacture of arms is extensive. Pop. (1891) 6,020.

FOURCHÉE, *a. fōr-shā'* [F. *fourché*, forked]: in *her.*, a cross forked at the ends.

FOURCHETTE, *n. fōr-shēt'* [F. a table-fork—from L. *furca*, a fork]: the bone in birds formed by the junction of the clavicles; the furculum; the wishing-bone in a fowl.

FOURCHING, *n. fūrsh'ing* [from Norm.F. *fourche*, to delay, to put off]: in *law*, the act of delaying legal proceedings.

FOURCROY'A: genus of plants of nat. ord. *Amaryllidææ*, nearly allied to *Agave* (q.v.), but with stamens shorter than the corolla. The species all are tropical; The leaves of some—perhaps of all—yield a fibre similar to the PITA FLAX obtained from those of species of *Agave*.—The name is from Antoine François, Comte de Fourcroy, distinguished Fr. chemist (1755-1809).

FOURDRINIER MACHINE, *fōr-drin'î-ā*: paper-making machine, the first to make a continuous web. It was invented by Louis Robert, of Essonne, and patented by him in France. A Mr. Gamble and the brothers Fourdrinier improved it. It was perfected by others.

FOUR EVANGELISTS—FOURIER.

FOUR EVANGELISTS: four islands in a larger group of islands known as the *Twelve Apostles* off the w. entrance of the Strait of Magellan; about lat. 52° 34' s., and long. 75° 5' w. The eight other islands, with which they are classed as above, extend about 15 m. further into the Pacific.

FOUR-EYES: fish: see **ANABLEPS**.

FOURGON, n. *fôr'gông* [F.]: a tumbrel or ammunition-wagon; a French baggage vehicle.

FOURIER, *fô'rî-êr*, F. *fô-re-â'*, **FRANÇOIS MARIE CHARLES:** French Socialist: 1772, Apr. 7—1837, Oct. 8; b. Besançon. His father, a merchant, had him educated in an academy at Besançon, where he distinguished himself by perseverance and success in study, and excelled in geography, mathematics, music, and nat. sciences. He left his studies with regret to enter on the duties of a merchant's clerk, which he performed with zeal and integrity at Lyon, Rouen, Marseille, and Bordeaux. He also travelled in the interest of his employers, in France, Holland, and Germany. In these journeys and residences, nothing escaped his observation; he noted climate, culture, population, public and private edifices, and remembered even the topography of villages, and the dimensions of buildings, with astonishing accuracy. His father died 1781 leaving him about \$25,000, which he became possessed of 1793, and invested in trade at Lyon. This was lost in the Revolution; and he was thrown into prison, and compelled to serve two years as a cavalry soldier. Discharged for illness, he obtained employment in a mercantile house at Marseille, where he was employed to superintend the destruction of an immense quantity of rice, held for higher prices, in the midst of a scarcity of food, until it had become unfit for consumption. This called his attention to the frauds and duplicities of commerce, and he gave his spare time to social problems, until he developed the system of Socialism to which his name is commonly given. This system is contained in several works, written and published under discouraging circumstances. In 1808, he published *Théorie des Quatre Mouvements, et des Destinées Générales* (Theory of the Four Movements, and of the General Destinies of the Human Race). In 1822, he produced *Traité d'Association Domestique Agricole* (Treatise on Domestic and Agricultural Association); 1829, *Le Nouveau Monde Industriel et Sociétaire* (The New Industrial and Social World); 1831, *Pièges et Charlatanisme des Deux Sectes Saint-Simon et Owen, promettant l'Association et Progrès* (Snares and Quackeries of the Two Sects of St. Simonians and Owenites, promising Association and Progress); 1835, *La Fausse Industrie Morcelée, Repugnante Mensongère, et l'Antidote, l'Industrie Naturelle, Combinée, Attrayante, Véridique, donnant Quadruple Produit* (False Industry, Fragmentary, Repulsive, and Lying, and the Antidote, a Natural, Combined, Attractive, and Truthful Industry, giving Quadruple Products). These works, written in the midst of commercial pursuits, and published at long intervals, by

FOURIER—FOURIERISM.

means of his small savings, found for many years few readers, and no disciples. Toward the close of his life, a small group of intellectual men accepted his views, and gathered round him, to learn from his own lips the details of his social system. He was unwearied in efforts to interest men of power or capital, who could give his theories the test of practical application, and for many of the last years of his life waited patiently at a certain hour every day, expecting to be visited by such a patron. His less patient disciples probably hastened his death by immature and partial efforts at realization. He died in Paris. See **FOURIERISM**.

FOURIER, JEAN BAPTISTE JOSEPH, Baron: 1768, Mar. 21—1830, May 16; b. Auxerre: French mathematician. He became a pupil, and at the age of 18, prof. in the military school of his native place; was removed to the normal school in Paris, and then to the Polytechnic, and accompanied Gen. Bonaparte to Egypt. Besides performing political services on this occasion, he was sec. to the *Institut d'Egypte*, and an active contributor to the *Description de l'Egypte*, the masterly historical introduction to which is from his pen. On returning to France, he was made préfet of the dept. of Isère 1802, an office which he held till 1815; and was created baron 1808. As préfet he succeeded in draining the marshes in Bourgoin, near Lyon, which had for centuries baffled all attempts. On the return of Napoleon from Elba, F. issued a royalist proclamation; notwithstanding which he was appointed by Napoleon préfet of the dept. of the Rhone, but was soon removed. He now took up his abode in Paris, and applied himself exclusively to science. The Acad. of Sciences, which in 1807 had crowned his essay on the propagation of heat through solid bodies, chose him a member 1815, and afterward sec. for life, conjointly with Cuvier. His most famous work is *Théorie Analytique de la Chaleur* (Par. 1822), in which he applies new methods of mathematical investigation. An allied subject is discussed in *Mémoire sur les Températures du Globe Terrestre et des Espaces Planétaires* (Par. 1827). Besides heat he occupied himself with important improvements in the theory of equations. His work, *Analyse des Equations Déterminées*, distinguished for its substance and manner of exposition, left unfinished, was published after his death (Par. 1831).

FOURIERISM, *fô'ri-ér-izm*: Social System invented by the theorist, François Marie Charles Fourier (q.v.), is contained in his published works, in a large collection of unpublished mss., and in the writings of Considerant, Lechevallier, Brisbane, and others of his disciples. It differs materially from the systems of Communism strictly so called, and from all other social theories, and professes to be based on natural laws, and capable of being carried out on mathematical principles, as fixed and certain as those of geometry, music, or colors. The earth and human society, Fourier taught, are in their crude and infantile stage. The period of the race will be 80,000 years, the latter portion of which will be its declining phase, as the present is its

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ascending. The middle term will be a long period of maturity, prosperity, and happiness. What we call civilization, Fourier considers a false and imperfect condition, with poverty, crime, ignorance, idleness, repugnant toil, disease, wasting wars, general antagonism, oppression, and misery. He believed that Association would produce general riches, honesty, attractive and varied industry, health, peace, and universal happiness. Considering attractions and repulsions the governing forces of all nature, and that God has distributed them for the happiness of all His creatures, he held that 'attractions are proportional to destinies,' or that the desires or passions of men, their aptitudes and inclinations, if they could have free scope, would infallibly produce the highest condition and greatest happiness of which they are capable. He believed in a universal harmony, flowing from and centering in God, the author of all harmonies, and that there is therefore a principle of 'universal analogy.' Seeing that all things, from suns and planets to atoms, range themselves in groups and series according to certain fixed laws of attraction and repulsion, he labored to discover the kind of human society that must eventually form itself in obedience to those laws. This is the Association or Phalanstery, which is to consist of 400 families or 1,600 persons, which number he found included the whole circle of human capacities. These should live in one immense edifice, in the centre of a large and highly cultivated domain, and furnished with workshops, studios, and all the appliances of industry and art, as well as all the sources of amusement and pleasure. When the earth is covered with palaces of attractive industry, the associations also will unite in groups and series, under a unitary government. There will be but one language and one government, and the only armies will be the great industrial armies, which will drain swamps, irrigate deserts, plant forests, and effect amelioration of climates. The system of Fourier does not propose to destroy, but rather to conserve property, position, and hereditary rights, nor does it war directly with morals or religion. The property of the Association is to be held in shares, and the whole product of the industrial and artistic groups is to be divided into twelve parts, of which five parts are due to labor, four to capital, and three to talent. The apartments are to be of various prices, and the styles of living to vary in luxury and cost; but the poorest person in the Association is not only to be secure of comfort, but his minimum of enjoyments will be greater than the present social arrangements can give to princes and millionaires; while these will have opened to them pleasures of which they can now scarcely have a conception. The economics of the large scale in the Phalanstery would reduce by two-thirds the expenses of living, while an attractive and scientific industry would quadruple the products of civilization.

The passions of the human soul to which the system of Fourier would give full scope, he described as the five sensitive—sight, hearing, taste, smell, touch; four affective—

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friendship, love, ambition, and paternity; three distributive—the emulative, alternating, and composite. In these he found the springs of industry and true society. Emulation, the desire of success, honors, rewards, are the great stimulants to exertion; alternation of employments makes work a recreation; and the composite passion requires combinations of charm and enjoyment which only Association can give. Many attempts have been made—a few in France, and more in America—to carry the ideas of Fourier into practical realization; but they all have been on a small scale, with inadequate means, and have resulted in failure. Whatever may be thought of the system in its principles or its theoretical development, nothing can be founded upon the failure of such experiments. It remains to be proved whether human nature in its present state is capable of carrying out successfully a social system so widely varying from all existing social conditions. The moral objections to Fourierism are, that it appears to make luxury, ambition, and sensual delights the end of existence—the incentives and rewards to all exertions; and that the passions of men, when left in the perfect freedom which this system requires, would lead to ruinous demoralizations. The answer is, that ‘attractions are proportional to destinies,’ and that these excesses belong to the present state, and are incident to the poverty and repressions of civilization, but could not exist in a true society; which raises the question—What is a true society? The study of this strange theory in the works of Fourier is suggestive to the student of socialogy.—See COMMUNISM: SOCIALISM.

FOUR LAKES: chain of connected sheets of water in Wisconsin; fed chiefly by springs. They form, through their outlet, the Catfish, a n.e. source of the Mississippi. They are navigable for steamboats, and drain a beautiful country. Madison, cap. of the state, stands on the strip of land which separates the uppermost of the series from the next in order.

FOURNEAU, n. *fôr'nō* [F. a stove]: in *mil.*, the chamber of a minè in which the powder is placed.

FOURNI ISLANDS, *fôr-nē* (anc. *Corássiæ* or *Córseæ*): group of about 20 small islands in the Grecian Archipelago, between Nicaria and Samos on the e. coast of Asiatic Turkey: the largest is about five m. in circuit.

FOUTRA, n. *fô'tră* [Scot. *fouttour*; OE. *fouter*, expression of great contempt: OF. and slang, *foutre*, to have intercourse]: in *OE.*, a term expressive of the utmost contempt; a fig for you.

FOVEATE, a. *fô've-ăt*, or **FOVEOLATE**, a. *fô've-ô-lăt* [L. *fôvĕă*, a pit]: in *bot.*, having pits or depressions called **FOVÆ**, n. plu. *fô've-ĕ*, or **FO'VEOLÆ**, n. plu. *-ô-lĕ*. **FOVEA**, n. *fô've-ă*, the depression containing the sporangium in Lycopods.

FOVILLA, n. *fô-vîl'lă* [L. *fôvĕō*, I nourish]: in *bot.*, the viscid protoplasm contained in grains of pollen.

FOWEY—FOWL.

FOWEY, *foy*, or *Fox*: borough town on the s. coast of Cornwall, England; on the right bank of the river Fowey, 25 m. s.s.w. of Launceston. It is sheltered by hills, and lies amid picturesque scenery, rude sea-cliffs, and promontories. The harbor admits large vessels at all tides, and its entrance is guarded by three forts. The chief business is catching and curing pilehards, which, with 'china-stone' and iron-ore, are the main exports. F. sent 47 ships and 770 men to the siege of Calais by Edward III. 1347. It was burned by the French 1457, and taken by Fairfax 1646. Pop. about 1,700

FOWL, n. *fowl* [Goth. *fugls*; Ger. *vogel*; Icel. *fugl*, a fowl: AS. *fugol*, a bird—from AS. *flug*, flight, allied to Lat. root *fug-*, to flee]: a cock or hen; a bird; poultry: V. to take or catch birds for food, or as game. **FOWLING**, imp.: N. the act or practice of shooting fowls or birds (see below). **FOWLED**, pp. *fowld*. **FOWLER**, n. one who takes or kills birds for food. **FOWLING-PIECE**, a light gun for shooting birds; formerly of wrought iron, now usually of cast steel. Breach-loaders are now favored, though muzzle-loaders are preferred by some sportsmen. The gun requires in construction much mechanical skill. **FOWLS OF WARREN**, birds kept in a preserve. Lord Coke says they are 'the partridge, quail, rail, etc.,' 'pheasant, woodcock, etc.,' and the 'mallard, heron, etc.' (*Co. Litt.* 233) Manwood lays it down that there are only two fowls of warren, the pheasant and the partridge (*Manw.* 95). In England it has been decided that grouse are not birds of warren.

FOWL: originally synonymous with *bird*, and still used in that signification; but usually restricted to that genus of birds (*Gallus*) to which the common domestic fowl (*G. domesticus*) belongs. This genus gives its name to the important order of *Gallinaceous Birds*, called also from their habit of scraping the earth in search of food, *Rasores* (Lat. Serapers); and is included in the family *Phasianidæ*, with pheasants, tragopans, etc. The general form, and the characters of the bill, feet, etc., agree with those of the pheasants; but the crown of the head is generally naked, and furnished with a fleshy *comb*, the base of the lower mandibles also bearing fleshy lobes or *wattles*, characters most conspicuous in the males; and the tail is very different from that of the pheasants, indeed very singularly formed, being composed of 14 feathers in two nearly vertical planes, or as if a horizontal tail were folded together, so as to make a sharp angle at top, the two middle feathers being the uppermost, and in the males elongated beyond the rest, and gracefully arched. The tail-coverts of the male are also very ample, and the feathers of the back of the head and of the neck are either elongated and loosely webbed, forming the *hackles*, valued by anglers for dressing artificial flies, or are otherwise modified for adornment; characters sometimes exhibited in a very inferior degree in the female sex also. The legs of the male are armed with spurs, as in the pheasants, of which much use is made in the combats of these birds among themselves, all being very pugnacious. They all are polygamous, and

unable to endure the presence of a rival. All are natives of the E. Indies and of the Malayan Archipelago. From what country, and at what period the domestic fowl was introduced into Europe, is uncertain. The remains of Egyptian antiquity carry us back to a period when it was apparently unknown in Egypt, and there is no distinct allusion to it in the Old Testament; but it seems to have been common in the s. of Europe from the earliest ages of European civilization. The cock was sacred to Apollo, to Mercury, to Mars, and to Æsculapius. It was figured on Grecian and Roman coins and gems; it was highly valued for its courage and pugnacity, and the sport of cock-fighting was a favorite both with the Greeks and the Romans, as it is among the Chinese, the Malays, and many other nations at the present day, and in former times was among all classes of society even in Britain: see COCK-FIGHTING. The domestic fowl appears to have been known to the ancient Britons before the Roman invasion; and when the South Sea Islands were first visited by Europeans, it was found there in the same domesticated state, and there also cock-fighting was found a favorite amusement of the savage natives. The native country of the domestic fowl is not known, nor is it certain what the species is in its original state. The ancient Greeks sometimes called it the *Persian Bird*, whence it has been supposed a native of Persia; but there is nothing else to support this opinion, and probably this appellation may at most indicate only its introduction into Greece from Persia. The Jungle Fowl of India, first species of *Gallus* known in its wild state to naturalists, was for some time supposed the origin of the domestic fowl, but to this opinion there are strong objections in the very peculiar character of some of the feathers which distinguish the Jungle Fowl, and of which no trace ever appears in the domestic fowl. More recently, the Bankiva Fowl and other species have been discovered in Java and other islands of the Eastern Archipelago, more nearly resembling the domestic fowl, and the distribution of the latter through the islands of the Pacific Ocean is favorable to the belief that it derived its origin from that region; still the identification of the species remains difficult, and some naturalists incline to the opinion that the domestic fowl may be derived from intermixture of distinct wild races.

The BANKIVA FOWL (*G. Bankiva*), native of Java, is extremely similar to some domestic varieties; indeed, Sir William Jardine says: 'Many Bantams so nearly resemble this bird, that there would be great difficulty in making a distinction. The comb is large and lobed, or dentelated; the colors are brilliant, steel-blue and chestnut, black and yellowish brown, the hackles abundant and golden orange; some parts of the plumage exhibiting a very fine play of colors. A very similar species, or a variety of the same, but rather larger, is found in some parts of continental India.' Very similar also is the BRONZED FOWL (*G. aneus*), found in Sumatra, resplendent in metallic green, purple, and lake; but of which the comb has the upper margin unbroken; the wattles are combined into one attached to the

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Centre of the throat; and the neck feathers do not assume the *hackle* character, which appears in the neighborhood of the tail alone. These peculiarities belong also to the **FORK-TAILED FOWL** (*G. furcatus* or *Javanicus*), a species abundant in the jungles of Java, and often seen on their outskirts, nearly two ft. in length from the tip of the bill to the extremity of the tail. A still larger species—if, indeed, these are not rather varieties than species—is the **GIGANTIC FOWL**, **JAGO FOWL**, or **KULM FOWL** (*G. giganteus*) of Sumatra, with double wattle under the throat, abundant hackles on the head, neck, and upper part of the back, green and reddish yellow the principal colors, and the height considerably more than two ft.—The **JUNGLE FOWL** (*G. Sonneratii*), abundant in the higher wooded districts of India, where it is much sought by European sportsmen, is about equal in size to an ordinary domestic fowl, but is more slender and graceful in its form; the comb of the male is large, and its margin broken; the colors are rich and beautiful; but a remarkable peculiarity is in the hackle feathers, which are terminated by flat horny plates of a golden orange color, into which the shaft expands, or the shaft thickening and terminating abruptly gives rise to a battledore-like stem and disk, in substance like the tips of some of the feathers of the wax-wing.

The Domestic Fowl is kept principally for its eggs and flesh. Its feathers are of some value, it is useful for destroying various insect pests, and some breeds are kept for ornament. It is almost invariably kept in considerable numbers on farms, and in the vicinity of towns and cities many people make its rearing and care their sole occupation. It is claimed that the annual value of the eggs and flesh of the domestic fowl sold in this country exceeds that of any other live stock or any agricultural product.

No special effort to improve the quality or increase the productiveness of the domestic fowl was made either in this country or Great Britain until about 1825 and it was not until about 20 years later that any degree of enthusiasm was aroused. In 1845 the Cochin China breed, which had recently been introduced, became immensely popular in England. Prices were almost fabulous. Cocks were readily sold for a hundred guineas each. About the same time interest was awakened in this country. Importations from China were made in 1847 or 48, and in the latter year a poultry show was held in New York. The interest soon became a kind of mania, and the 'hen fever' raged for years. Immense prices were paid for stock, and eggs of certain breeds were almost as valuable as gold. Many foreign breeds have been imported, native fowls have been improved by selection and crossing, and new and valuable breeds have been formed. A number of papers solely in this interest are published and widely circulated; many books on fowls have been published; the exhibition of fowls is a prominent feature of agricultural fairs, while a large number of societies of poultry raisers hold annual meetings.

The early importations of foreign fowls were confined to the large Asiatic breeds. About 1850 the Brahma was in-

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roduced. This was followed by the Shanghai some five years later. Since that time other large breeds have been brought from Asia, while many smaller, principally from s. Europe, have been introduced and become popular.

The following are among the more important classes and breeds of the domestic fowl now popular in this country. Of the large Asiatic breeds the Brahma is one of the most desirable. The fowls are large, hardy, grow rapidly, are excellent layers, especially in winter, are very quiet and not inclined to scratch or roam. The principal objections are the rather long time required in which to arrive at maturity, and a tendency, unless carefully fed, to take on flesh at the expense of the laying qualities. Among the other valuable breeds of this class, and with the same general characteristics, are the Cochins, of which the Buff, Black, White, and Partridge are the most popular representatives; and the Langshans, introduced here from n. China about 1876. Among the smaller Asiatic fowls the Games, of which there are many varieties, are noted for their fierce and quarrelsome disposition, for the excellence of their flesh, and for their fine laying qualities. The Bantams are diminutive in size, are layers, and make pleasing pets. The Game and the Golden Sebright are among the best varieties. Of European breeds, the Dorking is one of the oldest and best. It was undoubtedly kept by the ancient Romans, has long been one of the most popular fowls in England, and is a favorite wherever kept. It grows to a large size, the flesh is of the finest quality, it matures early, and is a moderately good layer. Is very quiet and beautiful, and if purely bred has five toes on each foot. The White, Colored, and Silver-Gray are among the best varieties. The Houdans, introduced from France, are the most popular of the several breeds from that country. They are of good size, hardy, good layers, particularly in winter, do not incline to sit, bear confinement well, and are excellent for the table. Of the Spanish fowls the breed known as the Black Spanish is the principal one kept in this country. Their flesh is good and they are excellent layers, but require a warm place in winter. The Polish fowls, of which the White-Crested Black Polish, the Bearded Golden Polish, and the Bearded Silver Polish, are among the best, are good layers, non-sitters, are of medium size, bear confinement well, and are easily fattened. The Leghorns, of which the White and Brown are the most popular, are extremely valuable for egg-production. They are small, seldom sit, are inclined to roam, and are not desirable for the table. The Hamburgs also are small, good layers, non-sitters, apt to wander, and inferior for the table; they are prized for their appearance. The Golden-Spangled and the Silver-Pencilled are among leading varieties. Of American breeds the Plymouth Rock is large, grows rapidly, matures early, is excellent for the table and for egg-production, and is hardy and vigorous; the American Sebright is of good size and valuable for both flesh and eggs; and the Black Java, originated in Missouri about 1848, is large, hardy, a good layer, and excellent for the table. The Wvandotte is a compara-

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tively new breed resembling the Plymouth Rock. A large proportion of the domestic fowls kept on farms are crosses of various varieties and are inferior to those which have been more carefully bred. Immense numbers of eggs are now hatched by artificial means [see INCUBATION], which proves an important aid, especially when the non sitting breeds are kept. For management of the domestic fowl in health and disease, see POULTRY.

FOWLER, *fow'ler*, CHARLES HENRY, D.D., LL.D.: Bp. of the Meth. Episc. Church: b. Burford, Canada, 1837, Aug. 11. He removed with his parents to Ill. 1841, spent several years on his father's farm, graduated at Genesee College, Lima, N. Y., 1859, and at the Garrett Biblical Institute, Evanston, Ill., 1861; entered the ministry of the Meth. Episc. Church 1861, and preached in Chicago till 1872, when he was elected pres. of Northwestern Univ. He resigned this office on being elected editor of the *New York Christian Advocate* 1876; in 1880 he was elected a cor. sec. of the missionary soc., and 1884 bp. He was a member of the gen. conferences of 1872, 76, 80, 84, and received the degree D.D., from Northwestern Univ., and LL.D. from Syracuse University.

FOWLER, ORSON SQUIRE; 1809, Oct. 11—1887, Aug. 18; b. Cohocton, Steuben co., N. Y.; phrenologist. He graduated at Amherst College 1834, with his brother LORENZO NILES F (b. 1811, June 23), established an office in New York 1835, began lecturing on phrenology and editing and publishing books and periodicals on the subject 1836, removed to Boston 1863, and to Manchester, Mass., 1875; and continued his labor as author till shortly before his death. His numerous works include: *Memory and Intellectual Improvement* (1841); *Physiology, Animal and Mental* (1842). *Matrimony: or Phrenology applied to the Selection of Companions* (1842); *Self-Culture and Perfection of Character* (1843); *Hereditary Descent, its Laws and Facts applied to Human Improvement* (1843); *Love and Parentage* (1844); *The Self-Instructor in Phrenology and Physiology* (1849); *Sexual Science* (1870); *Amativeness; Human Science; and Creative Science*.

FOWLERITE, n. *fow'ler-īt* [named after Fowler, who mentioned it in the *American Journal of Science* 1825]: zinciferous variety rhodonite. It occurs at Franklin, New Jersey. It is called by Thomson ferrosilicate of manganese.

FOWLER'S SOLUTION: see ARSENIC.

FOWLING.

FOWLING: killing or taking of birds for their flesh, feathers, etc.; variously practiced in different parts of the world. In some places where the people depend on it for their subsistence, it is prosecuted with great toil and danger; elsewhere it is an expensive recreation. Nets are much used in the capture of many kinds of birds, particularly small birds intended for the table; bird-lime is used for the taking of great numbers near their drinking-places; gins, springes, and traps of various kinds also are employed. The numerous kinds of ducks, geese, and other *Anatidæ*, are, in an economical point of view, among the most important of birds, and the methods of their capture are various and interesting: see **WILD-FOWL**.

Of all kinds of fowling, *Rock-fowling*, on which the inhabitants of many northern coasts and islands in a great measure depend for their means of subsistence, is the most adventurous. The objects of pursuit are gannets or solan geese, gulls, terns, guillemots, and other sea-birds, which frequent the most lofty precipices, and breed on their shelves and ledges. The flesh, even of the best of them, is generally coarse, and of a fishy taste, yet both fresh, and salted for winter provisions, it forms great part of the food of the poor people. The flesh of the young is more tender and pleasant than that of adult birds. The eggs of some species are sought by the same perilous means as the birds themselves. The feathers and oil are articles of commerce. The people of St. Kilda pay part of their rent in feathers and fulmar oil, the rocks being apportioned among the inhabitants as exactly as its soil. Almost every man in the island is a cragsman or rock-fowler, which is nearly the case also in many other northern isles of Britain. The multitudes of sea-fowl around many of the rocky northern coasts is prodigious, resembling at a distance—as may be seen at the Bass Rock in the Firth of Forth—the bees around a busy hive. Uninhabited islets are annually visited by fowlers, as Borrera by the people of St. Kilda; and the ‘stacks,’ or high insular rocks near the shore, are often extremely productive. These are, of course, reached by boats; and while landing is often difficult and dangerous, the climbing of the precipice is still more so. The Norwegian fowlers, or ‘bird-men,’ carry on such expeditions with a *bird-pole* or *fowling-staff*, about five or six yards long, and a rope of several fathoms. The bird-pole has an iron hook at one end: it has also a flat head; and by means of it the fowler is pushed and guided by his comrades below as he ascends a very steep or precipitous cliff; by means of it, also, he strikes down or draws in birds. The rope is used to fasten two fowlers together, being attached to the waist of each: they aid one another in climbing, pushing, and drawing one another up the rocks, the safety of the one often depending on the strength and courage of the other. The bird-pole is used also with a small net attached in the capture of birds flying around. The Norwegian fowlers sometimes remain for days on ledges where birds are abundant, sleeping in holes or clefts, and having food let down to them by rope from above.

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Still more perilous, if possible, is the mode of fowling practiced where the precipices cannot be scaled. The fowler is let down by a rope, and hangs in mid-air, often at an elevation of several hundred ft., above rough rocks or roaring waves; and by means of his feet or of a pole throws himself out to such a distance from the face of the



The Holm of Noss, Shetland.

rock as to obtain a view of all its ledges and crannies, to which, with astonishing coolness and dexterity, he directs his course, often also catching the birds that fly near him in the air. Speaking of the fowlers of St. Kilda, Wilson (*Voyage Round the Coasts of Scotland and the Isles*) remarks: 'How one man (for such is the case), himself standing with the points of his toes upon the verge of a precipice many hundred ft. deep, can, with such secure and unerring strength, sustain the entire weight of another man bounding from point to point below him with irregular and frequent springs, is what a stranger cannot understand. . . . But we ascertained that there is never more than a single man above supporting the weight of the one below. Each of these couples has two ropes. The rope which the upper man holds in his hands is fastened round the body and beneath the arms of him who descends, while another rope is pressed by the feet of the upper man, and is held in the hand of the lower.' The second rope is for giving signals, and for sending up birds when captured. The principal rope used to be made of twisted raw cow-hide; it was so durable as to last for two generations, and was bequeathed as valuable property by father to son. Manilla hemp is now chiefly used instead. The practice differs also as to

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the number of comrades holding the rope above. In the Faroe Isles, where some of the precipices are 1,400 ft. in height, the rope is usually held by a number of men. In some of the Scottish islands, fowlers have been adventurous enough to descend the cliffs unaided, fastening the rope for themselves to a stake driven into the ground above. The fowlers of the Faroe Isles sometimes use the pole with net at the end, while suspended in the air. It is not unusual for the fowler, when he finds a ledge or recess in the precipice abounding in birds, to disengage himself from the rope while he pursues his labors there; but when the precipice overhangs above, he is exposed to a great danger of the rope's escaping from his reach. A case is on record in which the only resource of the fowler was to make a desperate spring and catch the rope, which hung a few ft. before him in the air; and this he succeeded in doing.

The cut represents rock-fowling at the Holm of Noss, a precipitous insular rock, separated from Noss, one of the Shetland Isles, by a chasm 65 ft. wide, and 160 ft. deep, over which ropes have been stretched, so that a *cradle* or sparred box can be made to pass along them, affording access to the grassy summit of the Holm, where a few sheep are occasionally fed, and where innumerable sea-birds make their nests.

FOWL MEADOW GRASS (*Poa serotina*): one of the most valuable varieties of grass for moist land: known in some localities as False Redtop. It is common in the northern portions of the United States and Canada; also largely grown in Europe. The roots are slightly creeping. The flowered spikelets, which appear in July and August, are green with a purple tinge. It yields large crops, is easily cured, and makes very palatable and nutritious hay for cows and sheep. Unlike most grasses, it is not seriously injured by standing late in the season. It is also valuable for pasturage. F. M. G. gives best results when mixed with other grasses.

FOWNES, *fownz*, GEORGE, PH.D., F.R.S.: 1815-1849. Jan. 31; b. London: chemist. He studied chemistry with Prof. Everett, London, and Prof. Liebig, Giessen; and became lecturer on chemistry at Charing Cross Med. School, Middlesex Hospital Med. School, and the Pharmaceutical Societies' Med. School, and director of the Birkbeck chemical laboratory in Univ. College, London. He took the Acton prize with an essay on *Chemistry as exemplifying the Wisdom and Beneficence of God* (1844), and published *Chemical Tables* (1846); *Introduction to Qualitative Analysis* (1846); *Rudimentary Chemistry*, (1848); and *Manual of Elementary Chemistry*, which was revised several times before and after his death, and has had extensive use as a textbook.

FOX.

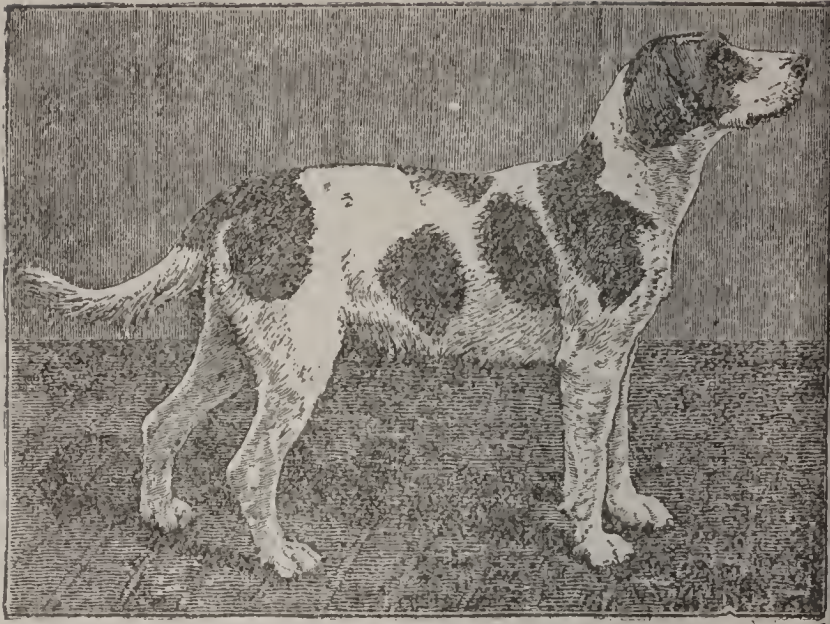
FOX, n. *föks* [Goth. *fauko*; Ger. *fuchs*; Icel. *fox* or *föa*, a fox]: an animal of the dog kind noted for its cunning; a sly cunning fellow; in *OE.*, a cant term for a sword. **FOX-BATS**, the very large fruit-eating bats of E. Indies. **FOX-BRUSH**, the tail of a fox—usually called *the brush*. **FOX-GRAPE**, *Vitis vulpina*, so called because its fruit has a foxy taste; native of N. America, where it is cultivated. **FOX-HOUND**, a hound for hunting the fox; not quite so large as the staghound, and perhaps a mixed breed between the staghound or the bloodhound and the greyhound. The color is commonly white, with large patches of black and tan color. Their speed and perseverance are remarkable; they have been known 'to run hard for ten hours before they came up with and killed the fox, and the sportsmen were either thrown out, or changed horses three times. **FOX-HUNT**, the chase or hunting of the fox (see **FOX-HUNTING**). **FOX'SHIP**, n. the qualities of a fox; cunning. **FOX'Y**, a. -y, having the color of a fox. **FOXLIKE**, a. resembling the cunning of a fox.

FOX (*Vulpes*): genus of *Canidæ* (q.v.), particularly distinguished from dogs, wolves, jackals, etc., by the pupils of the eyes contracting vertically, and in the form of the section of a lens, not circularly. This takes place whenever the eyes are turned to a strong light, and all foxes



The Common Fox (*Vulpes vulgaris*).

are nocturnal animals. Foxes generally are also of lower stature in proportion to their length than the other *Canidæ*; they have a roundish head, with a very pointed muzzle, short triangular ears, slender limbs, and a bushy tail. They dig burrows for themselves in the earth, or take possession of holes already existing. They are famous for their cunning, which is seen both in their artifices for obtaining prey, and for escaping from danger. They feed on small quadrupeds, birds, eggs, etc.; some of them also partly on fruits and other vegetable substances.—The **COMMON FOX** (*V. vulgaris*), native of most parts of Europe, is the only British species, and is still abundant in many parts of the country, though from many parts it would probably have been extirpated ere now, unless it had been



Foxhound.



Foxglove (*Digitalis purpurea*).
Another specimen.



Chevron fracted.



Franc.



Common Foxglove (*Digitalis purpurea*).

in some measure protected with a view to the sport of fox-hunting. The common fox is reddish brown above, white beneath; the outside of the ears black, a black line extending from the inner angle of the eye to the mouth; the legs mostly black, the end of the tail generally white, though specimens sometimes occur in which it is gray, or even black. The *Greyhound Fox* is a variety more slender and longer-limbed. The *Cur Fox*—frequent in upland moorish districts—is smaller than the common variety. There are other varieties. The fox has a gland under the tail, which secretes a very fetid substance, communicating to the whole animal its well-known smell. It breeds once in a year, having usually four, five, or six young ones in a litter. Its usual voice is a kind of yelp. Its senses of sight, hearing, and smelling are very acute. Innumerable anecdotes are on record illustrative of its cunning. The difficulty of setting traps so that they shall not be detected and avoided by it, is well known. Foxes are said to have been observed approaching water-fowl by swimming slowly with a turf in the mouth, so as to remain concealed. A most trustworthy person affirms, that he saw a fox approach a group of hares feeding in a field, with a slow, limping motion, and having his head down as if eating clover, till he was near enough, by a sudden rush, to secure very different food. Foxes captured in hen-roosts have often been known to simulate death, and to submit to being dragged about and very roughly treated without a sign of life, till an opportunity of escape presented itself. When they are driven to their holes, and these are surrounded with traps, they frequently show such appreciation of the danger, that they will endure starvation for days and even weeks rather than come out. Even when taken young, the common fox can hardly be tamed; and very few instances are on record of its showing even a little of that attachment to man of which so many animals are capable, and for which the dog is remarkable. For improbability of any of the domestic races of dog being at all derived from the fox, see DOG. The French *renard* appears in English in *reynard*, the familiar appellation of the fox.—The south of Europe produces foxes of smaller size than the common fox, having the fur of the belly black, regarded by some as a mere variety, by others as a distinct species (*V. melanogaster*). They are less carnivorous, and to them some of the allusions and fables relate—as of the fox and grapes, etc.—which do not accord well with the habits of the foxes of n. Europe.—The Himalaya Mountains produce a species (*V. Himalaicus*) very similar to the common fox, but of superior size and brilliancy of colors. The fur is rich and fine.—The BLACK FOX of n. Asia is very similar to the common fox, but entirely of a velvety black color, except the tip of the tail, which is white; its fur is greatly esteemed, brings a high price, and is an article of export from Kamtchatka to China.—The COAL FOX (*V. alopex*) of some parts of Europe, as Switzerland and Bavaria, is by some naturalists regarded as distinct from the common fox. It is of inferior size more timid, and less troublesome; the

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tip of the tail is black.—North America has several species of fox, of which the RED FOX (*V. fulvus*) very nearly resembles the common fox of Europe, but is of rather larger size, has a shorter muzzle, eyes nearer each other, and a more copiously bushy tail. Its fur is also longer, finer, more brilliantly colored, and much more valuable, forming a considerable article of export from the fur countries; in which, as well as in Canada, and in the northern parts of the United States, this species is abundant. The CROSS FOX is a variety of it, distinguished by a longitudinal dark band along the back, crossed by a transverse band over the shoulders. The burrow of this fox 'at first inclines downward for four or five feet at an angle of about 25 degrees, it then inclines upward a little, which is a security against inundations, and is continued at a depth of about three or four ft. from the surface, until it reaches a point where it is divided into two or three galleries.' Great numbers of these foxes are annually tracked to their burrows, and digged or smoked out of them by American farmers.—The GRAY FOX (*V. Virginianus*) is the most abundant species of the southern states, extending, however, as far n. as Canada, where it is rare. It is of gray color, varied with black, is about the size of the common fox, but not so bold, and sometimes eats vegetable substances, such as ears of maize. The gray fox exhibits not a little of that cunning for which the common fox is celebrated, and when pursued by hunters and hounds, has been known to escape by getting upon the rail of a fence and running along it for some distance, so that the scent was lost. This was on one occasion done on the newly-laid rail of a railroad elevated above a swamp. It is not unfrequent for the gray fox, when hard pressed, to take refuge in a tree, particularly if one which has somewhat fallen from the perpendicular presents itself.—There are a number of other species of fox, Asiatic, African, and American; but the most deserving of notice is the ARCTIC FOX (*V. lagopus*), which inhabits the most northern parts of Europe, Asia, and America. It is very plentiful in Iceland, feeding much on ptarmigans, and sometimes on young lambs. Great numbers are found on the shores of Hudson's Bay, particularly during winter, and they have been supposed to migrate thither from still more northern regions; but it has been ascertained that this animal spends the winter even in the most northern regions that have ever been visited by man, braving the cold of Melville Island and Bank's Land, and finding abundance of food in the hares, marmots, ptarmigans, and other animals which also remain there. The Arctic Fox is rather smaller than the common fox; it is more densely clothed with a woolly fur, which on some parts is two inches in length; the tail is extremely bushy; and even the soles of the feet are thickly covered with hair. The color is pure white in winter, at least in very cold climates; varying to a brownish or bluish color in summer. It is gregarious, and many burrows are often found together. It is extremely cleanly in its habits, and is quite devoid of the offensive smell which belongs to

most of the foxes; it is also much less cunning, and much more easily trapped, as well as much more gentle and capable of being tamed. Its flesh has been sometimes eaten by arctic voyagers, with a relish due to the extreme cold of the climate, and the consequent demand of the system for animal food. Its fur is not nearly equal in value to that of the red fox.

FOX, CHARLES JAMES: English whig statesman: 1749 (N.S.), Jan. 24—1806, Sep. 13; second son of Henry F., first Lord Holland, by Lady Georgiana Carolina, eldest daughter of the Duke of Richmond. He was educated at Eton and Oxford, spending his vacations on the continent in the gayest and wittiest circles of the French capital, and visiting Switzerland and Italy. Notwithstanding the irregular life which he led even as a school-boy, he was distinguished for ability at school and college; and so high was his father's opinion of his talents, that at the age of 19 he had him brought into parliament as member for the borough of Midhurst, a step to which he is said to have been further incited by the fact, that, even at this early age, F.'s energies had found an outlet in gambling and various other forms of dissipation. His precocity in vice, as well as in intellectual development, is said to have been the result of the injudicious fondness of his unprincipled but gifted father. Till he attained his majority, F. prudently kept silent in the House, but immediately thereafter he appeared as a supporter of the administration of Lord North, and was rewarded with the office of one of the lords of the admiralty. In 1772, he resigned that office, and the following year was named a commissioner of the treasury. From that post he was dismissed, in consequence of a quarrel with Lord North, and passed over to the ranks of the opposition. During the whole course of the American war, he was the most formidable opponent of the coercive measures adopted by the government, and the most powerful advocate of the claims of the colonists; acting, to this extent at least, in accordance with the views which for many years before had been urged upon the country by the great Lord Chatham, the father of his future rival, Mr. Pitt. The difference between them was, that whereas Lord Chatham urged conciliation, in order to preserve the connection between the two countries, F. foresaw and foretold the necessity and the advantages of complete separation. In 1782, on the downfall of Lord North, F. was appointed one of the secretaries of state, which office he held till the death of the Marquis of Rockingham, when he was succeeded by the Earl of Shelburne, afterward Marquis of Lansdowne. On the dissolution of the Shelburne administration, the North and Fox coalition was formed, and F. resumed his former office; but the rejection of his India Bill by the house of lords soon led to the resignation of his government. It was now that Mr. Pitt came into power, and that the long and famous contest between him and F., who occupied the position of leader of the opposition, commenced. In 1788, he took a short respite from his public labors. Accompanied by his wife, he visited the

continent, and having spent a few days at Lausanne, in the company of Gibbon, who was there engaged in writing his famous history, he set out for Italy. The sudden illness of the king, however, and the necessity of constituting a regency, rendered it undesirable that he should be longer absent from England, and he hastened back to his post. The regency, the trial of Warren Hastings, the French Revolution, and the events which followed it, gave ample scope to the talents and energies of F., and on all occasions he employed his influence to modify, if not to counteract, the policy of his great rival. He was a strenuous opponent of the war with France, and an advocate of those non-intervention views which find greater favor in our day than they did in his. After the death of Pitt, F. was recalled to office, and endeavored to realize his doctrines by setting on foot negotiations for a peace with France, the results of which he did not live to witness. In private life, Mr. F. was a genial companion, kindly and sincere in the closer relations of friendship, while his conduct to those to whom he was opposed in public was generous, and free from every trace of malignity or enmity. Lord John Russell, in the preface to his *Memorials and Correspondence*, speaks of the singular candor, boldness, simplicity, and kindness of his character; and of his oratorical powers it is enough to record, that Burke called him 'the greatest debater the world ever saw,' and Sir James Mackintosh 'the most Demosthenian speaker since Demosthenes.' His remains were interred in Westminster Abbey, so near those of Pitt, as to suggest to Sir Walter Scott the couplet—

"Shed upon Fox's grave the tear,
"Twill trickle to his rival's bier."

See, besides the *Life and Times* and the *Memorials and Correspondence*, by Earl (then Lord John) Russell, the *Character of the late C. J. Fox*, by Dr. Parr (1809), and the interesting *Early History of C. J. Fox*, by G. O. Trevelyan (1880).

FOX, GEORGE: originator of the Society of Friends (q.v.), commonly called Quakers: 1624–1691, Jan. 13; b. Drayton, Leicestershire, England. At an early age he was employed in keeping sheep; then was apprenticed to a country shoemaker; but when about 19 years of age, his religious impressions produced such a strong conviction in him, that he believed himself the subject of a special Divine call; and abandoning his usual avocations, wandered solitarily through the country, dressed merely in a leathern doublet of his own making, and absorbed in spiritual reveries. After some time, his friends induced him to return home, but F. stayed with them for only a short period, and finally adopted the career of an itinerant religious reformer. About 1646, he left off attending church for divine worship, but did not scruple to interrupt the services when conducted by 'professors,' i.e. formalists, or persons whom he believed not to be genuine Christians. His first efforts at proselytism were made at Manchester

1648. The excitement caused was very great, and, in consequence, F. was imprisoned for some time as a disturber of the peace. His leading doctrines or convictions were: the futility of learning for the work of the ministry, the presence of Christ in the heart as the 'inner light' superseding all other lights, and the necessity of trying men's opinions and religions by the Holy Spirit and not by the Scriptures. F. next travelled through various midland counties, Derby, Leicester, and Northampton, exhorting the people in public places to forsake all vicious practices, drunkenness, swearing, etc., and to cultivate the Christian graces. He had a winning manner, and by his extreme earnestness made many converts. His followers were first contemptuously called 'Quakers' in 1650. According to Fox's own account, given in his *Journal*, 'This was Justice Bennet of Derby, who was the first that called us Quakers, because I bade them tremble at the word of the Lord.' The name has been commonly explained from the Quakers' agitation when 'moved by the Holy Spirit.' In 1655, F. was brought to London, and examined before Cromwell, who quickly saw that there was nothing in Quakerism to excite his apprehensions, and pronounced the doctrines and the character of its founder irreproachable. Nevertheless, for some years after this, F. had a hard struggle with his Puritan antagonists. In an age of dogmatism and fanaticism, it was not to be expected that the half-mystical spiritualities and grotesque practical crotchets of the Leicestershire shoemaker could meet with any official toleration. F. was constantly vilified and frequently imprisoned by country magistrates. In 1669, he married the widow of Judge Fell. He then went to America, where he spent two years in propagating his views with much success. On his return to England 1673, he was imprisoned for some time in Worcester jail, under the charge of having 'held a meeting from all parts of the nation for terrifying the king's subjects.' On his release, he visited Holland, and afterward Hamburg, Holstein, and Danzig, always endeavoring to persuade men to listen to the voice of Christ within them. He died in London. F. was not a man of broad and philosophic genius; he did not enrich the world with the multitude of his thoughts; in fact, there is a conspicuous poverty of intellect and sentiment manifested in his writings, but (as often happens in the case of a mystic) the earnestness and clearness with which, in the opinion of many, one great truth of Christianity was believed and urged, imparted an efficacy to his words that genius itself might envy. His doctrine of the universal 'inner light'—defended in a more learned fashion by Barclay (q.v.) in *Apology for the Quakers*—may be regarded as a protest against the narrow or at least excessive 'Scripturalism' of his age, but his understanding was not sufficiently clear and strong to guide him safely in all the consequences which he ventured to deduce from it. Hence have sprung most of the *niaiseries* of Quakerism. His writings were collected and published in 3 vols., 1664–1706. An edition in 8 vols. has been published at Philadelphia.—Compare

FOX.

Sewel's *History of the Quakers*; Neal's *Puritans*; Marsh's *Life of Fox* (1848); and *Lives by Janney* (Phila. 1853), *Watson* (Lond. 1860), etc.

FOX, GUSTAVUS VASA: 1821, June 13—1883, Oct. 29; b. Saugus, Mass.: U. S. naval officer. He entered the navy as midshipman 1838, and served on the coast survey, at various stations, through the Mexican war, and as commander of U. S. mail steamships, till 1856, when he resigned with the rank of lieut., and became agent of a Mass. woolen manufactory. In 1861, Feb., he was summoned to Washington to organize an expedition to relieve Maj. Anderson in Fort Sumter, but Pres. Buchanan, refused to sanction the movement. Under Pres. Lincoln's instructions he communicated with the garrison, and attempted to relieve it, but the confederates opened fire on the fort before he could land. After the surrender he brought away the gallant command. Soon afterward he was appointed by Pres. Lincoln asst. sec. of the navy, and held the office till the close of the war, rendering a service little noted by the public, but almost invaluable. In 1866 he was appointed a special commissioner to convey the congratulations of congress to Alexander II. of Russia on his escape from assassination, and made the voyage in the double-turret iron-clad *Miantonomoh*, the first monitor that ever crossed the ocean. He declined the offer of an admiral's commission, and resumed business relations in Lowell and Boston.

FOX, WILLIAM JOHNSON: orator and political writer: 1786—1864; son of a small Suffolk farmer, afterward a weaver at Norwich, England. He gave early promise of talent, and was sent to Homerton College, to be trained for the Congregational ministry. He subsequently seceded to Unitarianism, but ultimately shaking off all allegiance to existing Christian churches, he delivered a series of prelections at his chapel in South Place, Finsbury, London, which marked him out as the leader and organ of English rationalism. When the Anti-corn-law League enlisted the ablest platform orators of the day in the service of free trade, his bold and impassioned rhetoric greatly contributed to arouse and intensify public feeling. M. Guizot quotes his speeches as the most finished examples of oratory which the great conflict produced. Their effect upon the vast metropolitan audiences to which they were addressed was electric. F. also contributed by his pen to the success of free trade, and his *Letters of a Norwich Weaver Boy* were largely quoted and read. After the abolition of the Corn Laws, he was invited to stand for Oldham, which borough he represented in parliament 1847–63. Like most men who enter the house of commons late in life, F. did not altogether realize the oratorical promise of his platform and pulpit career. His best parliamentary speeches on the education of the people. As a politician he was ever a consistent member of the advanced liberal party. A succession of illnesses in his late years interfered with his attendance in parliament. He was among the earliest contribu-

tors to the *Westminster Review*, edited for many years the *Monthly Repository*, and largely contributed to various other organs of public opinion. His *Lectures, chiefly addressed to the Working-Classes*, were published in 3 vols. He was author of a philosophical dissertation on *Religious Ideas*, and other theological works.

FOXÉ, *fôks*, JOHN: martyrologist: 1517-87; b. Boston, Lincolnshire, England; of respectable parents. In 1533, he entered as a student at Brasenose College, Oxford; 1538 he took his bachelor's, 1543 his master's degree, and was elected a fellow of Magdalen College. He early showed inclination for Latin poetry, and wrote several plays in that language upon scriptural subjects. Of these the only one that remains, entitled *De Christo Triumphante*, was printed at London 1551, and at Basel 1556, 8vo, and in 1672. The religious movements of the times led him to study the great controversy between Popery and Protestantism, and becoming a convert to the principles of the Reformation, he was, 1545, July 22, expelled from his college for heresy. His father being dead, and his mother married again, his stepfather refused him any further aid, and he was reduced to great distress. For a short time he was employed as tutor to the children of Sir Thomas Lucy of Charlecote, Warwickshire, and afterward was engaged by the Duchess of Richmond as tutor to the children of her brother, the Earl of Surrey, then a state prisoner in the Tower. In this capacity he remained during the whole reign of Edward VI., but was never, notwithstanding Anthony Wood's assertion to the contrary, restored to his fellowship at Magdalen. 1550, June 23, he was ordained deacon by Ridley, Bp. of London, and preached the doctrines of the Reformation at Reigate. During the reign of Mary, he retired to the continent. On the accession of Queen Elizabeth, he returned to England, 1559, Oct.; and 1563, May, he was induced into the canonry and prebend of Shipton, in the cathedral of Salisbury. He had also the living of Cripplegate, which he soon resigned, and for a year he held a stall at Durham. In 1575, when some Dutch Anabaptists were condemned to the flames in London, F. interceded for them with Queen Elizabeth and other persons in authority, but without effect. He wrote numerous controversial and other works, but the one that has immortalized his name is his *History of the Acts and Monuments of the Church*, popularly known as *Foxe's Book of Martyrs*, the first part of which was published at Strasburg 1554. The first English edition appeared 1563, one vol. folio. Sanctioned by the bishops, it was ordered, by a canon of the Anglican Convocation, to be placed in the hall of every episcopal palace in England, and has gone through innumerable editions. It is not a very critical work, and Rom. Catholics deny its trustworthiness. F. died in his 70th year, and was buried in the chancel of St. Giles's, Cripplegate, London.

FOXES AND FOX-HUNTING.

FOXES AND FOX-HUNTING, in Law: important subject in many parts of England, where the law seems to stand thus: 'Though in general all persons who go upon another's lands without permission are trespassers in the eye of the law, yet there are some cases where the trespass is said to be justifiable,' says Paterson, a recent writer; and he quotes Blackstone's dictum to the effect that 'the common law warrants the hunting of ravenous beasts of prey, as badgers and foxes, in another man's land, because the destroying such creatures is said to be profitable to the public' (3 Black. Com. 212). Care must be taken, however, that no damage be done beyond what is necessary for the public good, for that is the ground on which alone the legal character of fox-hunting can be maintained. It was found, moreover, in *The Earl of Essex v. Chapel* (1 Chitt. Game L. 114), that though pursuing a fox on another's land be justifiable, yet, if it take to earth, or to a house there, it is not justifiable to dig or break doors for it. In Scotland, where, from the character of the country, fox-hunting is often impossible, it never has become a national sport; consequently, the rule that one is entitled to enter on the lands of another for the purpose of killing a fox, has been confined to those cases in which he is pursued simply as a noxious beast, and fox-hunting for sport without leave has been held punishable as a trespass, and the trespasser held liable for whatever surface damage he may occasion. In Ireland (by 1 and 2 Will. IV. c. 32. s. 35), persons pursuing with hounds any fox, hare, or deer which has been started elsewhere on another's land, are exempted from summary proceedings for trespass.—In the United States, in the more settled parts, fox-hunting is not frequent enough to have legal importance; but the general principles of law would probably have an application not very different from that in Scotland.

FOXGLOVE, n. *fōks'glŭv* [AS. *foresclife*, foxglove: said also to be a corruption of *folks'glove*, fairies' glove—this is not probable, seeing how common the anc. practice was of naming plants and flowers after animals]: a well-known poisonous and medicinal plant with flowers resembling fingers of a glove, of a purple or white color; the *Digitalis purŭrēa*, ord. *Scrophŭlārĭacēæ*, a most important medicinal plant: see DIGITALIS.

FOX-HUNTING: a sport, which from its exciting nature, as well as from the qualities of courage and cool calculation requisite in those who thoroughly follow and appreciate it, has long been termed the king of British national sports. In the northern United States it is scarcely known after the English fashion: in some southern states, less thickly settled, it is a favorite sport; though the *Gray fox* (*Vulpes Virginianus*) there pursued does not afford a chase either so long or so severe as the common fox in England gives.

In Great Britain, there are more than 100 hunting establishments, of which far the greater proportion belong to the counties s. of the Tweed. F.-H. establishments—in

FOX-HUNTING.

most instances supported by subscription, though sometimes owned by private gentlemen of wealth—are organized and maintained at a very considerable annual cost, the price of a single pack of foxhounds sometimes amounting to several thousand guineas. Every establishment is under the direct superintendence and control of one experienced gentleman, the *master*, and under him again rank the huntsman, whippers-in, earth-stopper, kennel-servants, etc. A 'pack' is composed of from 20 to 60 couples of hounds, the number depending upon the frequency of hunting-days: thus, some packs hunt six days, some five days, others four, and many only two days a week; 30 couples of hounds are a good average; these are carefully reared, fed, and otherwise attended to. The master himself has the general superintendence of the servants, hounds, and horses; and in the hunting-field is general director of the proceedings. Next to him come the huntsman and one, or two 'whippers-in' ('whips'). The huntsman, practically the most important personage in the field, requires to see that his hounds are properly managed and fed in their kennels; duly led to the place of meeting on hunting days; and, what is of more consequence still, that they receive fair-play in the field, and find and hunt their foxes in true style. The huntsman requires to be a man of great nerve and much activity: he should also have a good head, a clear ringing voice, a keen eye, and above all he must be a first-rate horseman, and know thoroughly every point in the country over which he hunts. He has often to restrain heedless riders, and 'keep the field back,' a duty requiring firmness of character, with a quiet and civil manner. With these necessary qualifications, and having so many responsible duties on his shoulders, he is treated with great respect by those for whom he provides sport. He is mounted on the best horses that his master can produce, and may be said to conduct and direct the hunt from the moment the fox is found till the moment of its death—from 'find to finish.'

The duties of the first whipper-in, though not so responsible as those of the huntsman, are considerable: for instance, he takes a certain management of the hounds in kennel, assists in conducting the hounds to the 'meet,' and aids the huntsman in various ways during the run. His knowledge of the management of hounds, and of F.-E. generally, must at the same time be such as to enable him to occupy the huntsman's place in an emergency. The 'second whip's' principal duty is that of bringing up and urging on lagging hounds in the field, by lashing and 'rating.' In many hunts, however, a second whipper-in is dispensed with.

A considerable range of country is necessary for the full enjoyment of F.-H., the best being diversified by pasturage and plantation. Being a nocturnal feeder, the fox quits his burrow or 'earth'—usually in a gorse brake, or a plantation or covert of underwood—during the night, and returns to it in the morning, and this fact is taken advantage of by those who hunt him for sport. The day and place of 'the meet' is duly advertised, and on the night before the

hunt, the coverts to be 'drawn' next day are visited either by a duly appointed *earth-stopper* or by the gamekeeper, who, knowing that the foxes are away from home, proceeds, spade in hand, from one hole to another, filling them up with earth and brushwood as he goes. Thus, the fox, returning at dawn to his 'earth,' finds ingress denied, and so betakes himself to some neighboring thicket, or to some unenclosed cover of gorse, rushes, etc., where he makes a temporary lair or 'kennel.' When the earths have been carefully closed, the earth-stopper returns home and informs the huntsman or first 'whip,' as to their number and locality, and that information forms a guide for the proceedings of the following day. (After the hunt is over, the earths are reopened, and as little trace as possible left of the work.) The hour of 'the meet' is usually 10 or 11 A.M., and at the appointed place assemble the whole 'field,' including master, huntsman, whippers-in, hounds, and those gentlemen (and frequently ladies) who intend either to participate in the day's sport, or merely to see the 'hounds throw off.' When a covert is reached, the huntsman, by a wave of his hand, or a few familiar words, such as 'Eu in! eu in there! good dogs!' 'throws in' his hounds, following immediately after with the first 'whip.' The mounted gentlemen usually remain outside, and take their directions as to stance, etc., from the master, who from this time forward does his best to control and direct their movements. In fact, the master may be said to have the control of the 'field'—that is, the riders—and the huntsman that of the hounds and hunt. The second whip being posted at the covert side, near where it is expected a fox may burst through or 'break,' one or two of the more eager riders are sometimes permitted to jump their horses into the covert, if it be large, to assist in the finding of the fox. Those who remain outside then prepare themselves for their work, and eagerly listen for the first token of the presence of reynard; this is betrayed by a slight but anxious whimper or whine from the 'challenging' hound—that is, the hound (usually an old and experienced one) that first perceives or 'hits' the scent of a fox—and is soon followed by others, who instantly rush to his side. The huntsman, if he be tolerably certain that the game scented is no other than a fox, at judicious intervals urges on his hounds by familiar expressions, such as 'Yoicks, yoicks, have at him!' 'Push him up!' etc., till the fox is fairly roused from his kennel, and steals away. It sometimes happens, while 'drawing' coverts, that hounds will come suddenly upon a fox, and seize him before he has time to escape. This is termed 'chopping,' and is always to be prevented if possible. If the covert be very thick, a fox may leave his kennel unperceived; and when he does so, he usually runs through or round the covert for a considerable distance before quitting it for the open fields. He may also 'run his foil,' by doubling back and forward on the same path or track, and thus possibly baffle the hounds, even when they 'own his scent.' In large coverts, too, a fox frequently 'hangs;' that is, he remains in it for a long

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time before going away. The person who first sees the fox 'break cover,' or, in other words 'views him away,' should always allow him a certain 'law' before giving the 'view halloo,' as a fox will frequently turn or 'head back' into covert if he hears any unusual noise at the instant of his quitting it. When, however, the person or persons watching see that the fox is really off, notice is instantly given to those within the thicket, and those without, by the cry of 'Hou—y! hou—y! Tallyho! *Gone away! GONE A-WAY!!*' upon which the huntsman blows his horn to collect his hounds; the whipper-in drives out lagging members of the pack, either with his whip or by some cry; the master restrains the more impatient of the riders till the huntsman and hounds have 'settled to' their fox; and then he and the entire field join in the chase, and the exciting part of the day's proceedings has commenced—the fox has 'broke cover,' the hounds have been 'laid on,' and the field has entered on its impetuous 'first burst.' A certain



Fox-hunting—'Laying on' the hounds.

etiquette is, however, absolutely necessary in allowing the hounds and huntsman to get away *first*; but after that, each rider, with a certain deference to the master, chooses his own place in the hunt, and does his best independently of his neighbors, to keep at a certain distance, not directly in the line, but to one side and in the rear of the hounds. When a rider happens to be near the pack at the first burst, and gets a good position in following them, he is said to 'get well away with the hounds;' and if well mounted and a skilful rider, his chances of both viewing the hunt and being 'in at the death' are very good. And now begins the grand excitement of the day; the fox being fresh, races away at tremendous speed, followed by perhaps more than 20 couples of hounds at full cry. If

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the day is propitious (a 'southerly wind and cloudy sky' having long retained favor), the scent of the retreating fox lies well, especially at first, when it is called 'burning' or 'breast high,' and is for many minutes 'owned' by at least all the leading hounds in the pack, though, perhaps, the object of pursuit itself is far ahead, and out of sight; and away streams the hunt over hedges, ditches, and gates, across rivers, railways, arable land, and grass pastures, perhaps for several miles before a single *check* occurs. Now, the foxhound hunts almost entirely by scent, and does not, like the greyhound, depend upon the eye. The fact of scent failing, therefore, at any time during the hunt, throws out the hounds, and prevents them from renewing it, until the scent is recovered, or 'hit off.' When the scent is 'burning,' hounds run almost mute, though at first, and at intervals afterward, they usually 'throw their tongues' pretty freely. When all the hounds are giving tongue, they are said to be at 'full cry,' and 'carry a good head,' the scent being on such occasions so thoroughly diffused as to be felt or 'owned' breast high by probably every member of the pack. Sometimes scent becomes so faint as to be hardly perceptible, and when this is the case, the energy of the hounds abates considerably; they then run with their heads close to the ground, and are said to hunt a 'cold' scent. Here, however, a little timely assistance from the huntsman is of the greatest moment in restoring animation to the pack. He waves his cap, blows his horn, and encourages his hounds by well-known expressions, to renewed exertions. When, as frequently happens from various causes, the scent fails entirely—such as the fox crossing water, running through a drove of sheep, 'heading back' in another direction, running along or lying upon the tops of walls or thick hedges, etc.—the hounds cease 'giving tongue,' suddenly stop, throw up their heads, and are 'at fault.' In this emergency, the 'field' remains at a respectful distance behind, and the huntsman knowing, or at least guessing by experience which way the fox has taken, or the special means that he has adopted for foiling the scent, allows his hounds at first, for a few moments, themselves to attempt to regain it; but failing that, and finding that his interference and assistance are necessary, he instantly blows his horn, and calls or 'lifts his hounds' from the place, and 'takes a cast' round and round about the spot where the scent failed, cheering them on the while. Thus, by gradually widening his casts, the scent is very frequently recovered or 'hit off,' a fact soon made apparent by the whimper of recognition given by the hound that first 'owns it,' followed by the answering tongues of the whole pack. When the hounds, however, fail to 'hit off' the scent, if the day be far advanced, they are taken home, or they are trotted on to some neighboring covert, which is drawn for a fresh fox.

When the fox is killed, either in 'the open' or elsewhere, the rider who is first in at 'the death'—usually the huntsman—springs off his horse, with a 'Whoo! whoop!' lashes the hounds off, and cuts off the head, feet (*pads*).

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and tail (the *brush*). He then flings the carcass to the hounds, who tear it to pieces, and devour it in a very few minutes. The brush is usually presented to any lady who may happen to be in at the death, or is claimed as a trophy by one or other of the gentlemen present. The *pads* likewise are distributed among those who may wish to preserve mementos of the chase. As a general rule, the huntsman, and several of the best mounted in the field, manage to be in, either at or immediately after the death, though instances are not wanting when, during usually protracted runs, the hounds have left every rider far behind, and have followed and killed their fox miles away from the spot where the last horseman had given in. A strong fox will frequently 'live' before hounds for an hour or an hour and a half; but cases have been known when this has been far exceeded, and when the run has extended to 30 or even 40 m. and has lasted all day, and even into the night. Young



Blood Hunter clearing a stone wall in good style (from Blaine's *Encyclopædia of Rural Sports*).

foxhounds begin their career by what is termed *cub-hunting*; but this, however necessary it may be for teaching them, is considered inferior sport to regular hunting.

The midland counties of England, such as Leicester, Northampton, Warwick, Yorkshire, etc., are the best for hunting purposes in Great Britain; and owe their superiority in a great measure to two causes: 1st, the strict preservation and consequent number of foxes; and 2d, the extensive tracts of pasturage favorable both for running and scent. The instinct of the fox leads him, as a general rule, to run *down* wind, that his scent may not be blown to the hounds; he also takes advantage of every peculiarity in a country likely to offer him an advantage over his foes.

The fox-hunter must be possessed of considerable courage, united with coolness, and must be a judge of pace

FOX INDIANS—FOX SHARK.

and have a good eye in 'riding to hounds,' to avoid tiring or 'overmarking' his horse unnecessarily. Much of the excitement and pleasure of the fox-hunter consists in his successfully leaping the various hedges, ditches, fences, etc., encountered; but at the same time, a really skilful and humane rider, however well mounted, will never knowingly urge his horse at a fence or leap of any kind, unless he is positively certain it is within his horse's power; and if he finds his horse betrays symptoms of distress, he will rather turn its head homewards, and forego the chase, than overtax its courage and strength.

Much useful and entertaining information on foxhunting is given in Blaine's *Encyclopædia of Rural Sports* (London, Longmans); *British Rural Sports*, by Stonehenge; Beckford's *Thoughts on Hunting*; *Reminiscences of a Huntsman*; *Nimrod*; *The Field* newspaper; etc.

FOX INDIANS: see SACS AND FOXES.

FOX ISLANDS: see ALEUTIAN ISLANDS.

FOX RIVER, or PISHTAKA: river of Wis., an affluent of the Illinois which is itself a tributary of the Mississippi. It is 200 m. long, and is valuable chiefly for its water-power.

FOX RIVER, or NEENAH: river of Wisconsin, abt 200 m. long, emptying into Green Bay in Lake Michigan. It is divided into two sections by Lake Winnebago, the upper section connected by a canal with the Wisconsin, so as to link together the Mississippi and the Great Lakes of the St. Lawrence.

FOX SHARK, or THRESHER (*Alopias* or *Alopecias*): genus of sharks, containing only one known species (*A. vulpes*), inhabitant of the Mediterranean and of the Atlantic. The

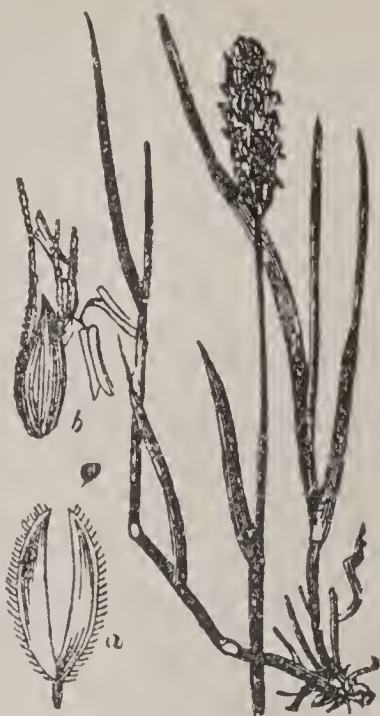


Fox Shark *Alopias vulpes*).

snout is short and conical; the spout-holes are very small; the mouth is not so large as that of the white shark, nor the teeth so formidable; but the F. S. is extremely bold and voracious, readily attacking grampuses or dolphins much larger than itself. Its most remarkable peculiarity is the great elongation of the upper lobe of the tail-fin, which is nearly equal in length to the whole body, and into which the vertebral column extends. Of this it makes use as a weapon, striking with great force. It is said to be not uncommon for a whole herd of dolphins to take flight at the first splash of the tail of a fox shark. From the use which it makes of its tail, it has acquired the name of Thresher. It attains a length, tail included, of 13 ft. The body is spindle-shaped.

FOXTAIL GRASS.

FOXTAIL GRASS (*Alopecurus*): a genus of grasses embracing several species. Distinguished by a spiked panicle compressed in cylindrical form like the tail of a fox, from which resemblance it receives its name. The two glumes are nearly equal, compressed, and usually united at the base. They inclose a floret which has a single palea bearing a long awn and surrounding three stamens and the pistil. F. G. is a native of temperate regions. It contains some useful species and several of no value, while some are regarded by the farmer as troublesome weeds. **MEADOW FOXTAIL GRASS** (*A. pratensis*). A native of Great Britain; cultivated successfully throughout Europe and in this country. In England it is considered one of the best of the meadow and pasture grasses; in the United States it is grown to some extent for hay, and is largely sown in permanent pastures. It requires three or four years to reach its maximum rate of production, but when once established remains long in the soil, attaining its highest perfection on moist, rich land, but fairly productive on all soils which are not either extremely dry or wet. It resembles Timothy (*Phleum pratense*), known in some sections as Herd's Grass, but has a softer head, only one palea, and flowers some weeks earlier. The seed is extremely small and weighs only five pounds per bushel. It is subject to blight and to the ravages of insects. While not among the best grasses for cultivation the Meadow Foxtail has few superiors for pastures, especially where the soil is moist and fertile. It starts early in the spring, grows quickly and luxuriantly after being eaten off by cattle, and the later growth is more abundant and more nutritious than the earlier product. In connection with other suitable grasses it should be liberally sown whenever pasture lands are laid down.



Foxtail Grass (*Alopecurus pratensis*):

a, glumes; b, floret.

FOY—FOYLE.

FOY, n. *foy* [F. *foi*, faith—from L. *fīdem*]: in *OE.*, faith; allegiance.

FOY, n. *foy* [probably a parallel form with Scot. *ploy*, a harmless frolic, a merry social party—perhaps from F. *foyer*, a fire-grate, a hearth: connected with **PLAY**, which see]: in *OE.*, a merry-making, as at a parting, or on entering upon a new situation; a merry entertainment.

FOY, MAXIMILIEN SÉBASTIEN: 1775, Feb. 3—1825, Nov. 28; b. Ham: French general and orator. In 1791, he was one of the volunteers who hastened to defend the frontiers of their country against foreign invasion, and during the next nine years served with distinction under Dumouriez, Moreau, and Massena. In 1800, he was raised to the rank of adj. gen. in the division of Moncey, in the army of the Rhine, which marched through Switzerland into Italy, where he commanded the vanguard of the army 1801. In 1805, he commanded the artillery of the second division in the Austrian campaign. In 1807, Napoleon sent him to Turkey, at the head of 1200 artillerymen, to assist Sultan Selim against the Russians and British. After the revolution in which Selim was dethroned, F., under the direction of the French ambassador, General Sebastiani, defended Constantinople and the Strait of the Dardanelles so effectively, that Duckworth, the British admiral, was forced to retire, with loss. 1808–12, F. was gen. of division of the army in Portugal; he conducted the retreat of the French army across the Douro, was present at all the battles of the Pyrenees, and at Orthez 1814 was dangerously wounded. In the campaign of 1815, he commanded a division on the field of Waterloo, where he was wounded for the 15th time. In 1819, he was elected deputy by the dept. of Aisne. In the chamber, he was the constant advocate of constitutional liberty, and showed great rhetorical talent and knowledge of political economy. F. died at Paris. Madame F. published, 1827, from her husband's papers, *Histoire de la Guerre de la Péninsule*. In the previous year appeared his *Discours*, with a biography.

FOYER, n. *foy'yā*, or *fwā'yā* [F. *foyer*, a fire-grate, a hearth—from L. *fōcus*, a fireplace]: the green-room; saloon in a theatre, etc., in which the audience may promenade during the intervals of an entertainment.

FOYERS: stream rising in the Monadleadh Mountains, in the middle of Inverness-shire, Scotland. It flows 12 m. n. and falls into the e. side of Loch Ness, nearly opposite Mealfourvounie Mountain. It has two celebrated falls within a mile and a half of its mouth, where the stream rushes through a deep, narrow ravine in the hills skirting the e. side of the loch. The upper fall is 30 feet high. The stream then descends 30 feet in a quarter of a mile. The lower fall (specially called *The Fall of Foyers*), 90 ft. high, is one of the finest cascades in Britain.

FOYLE, LOUGH: *loch foyl*: inlet of the Atlantic, on the

navigable. Vessels of 600 tons ascend the w. side of the lough, and its chief tributary the Foyle (which comes 16 m. from the s.), to Londonderry. On the e. shore is a flat strand with a sandy beach.

FOZY, a. *fō'zī*: in *Scot.*, spongy; very porous. FOZINESS, n. *fō'zī-nēs*, sponginess; obtuseness of mind.

FRA BARTOLOME'O: see BACCIO DELLA PORTA.

FRACAS, n. *frā-kā'* [F. *fracas*, a crash, destruction—from *fracasser*, to shatter—from It. *fracassare*, to break in pieces: a word imitative of a clatter of falling things]: a noisy quarrel; a brawl; an uproar.

FRACASTORO, *frā-kās-to'ro*, GIROLAMO: 1483–1553; b. Verona; of anc. family: Italian philosopher, famous for the universality of his learning. At the age of 19, he was appointed prof. of logic in the Univ. of Padua. But his vast knowledge embraced the most divergent sciences; and, on account of his eminence in the practice of medicine, he was elected physician of the Council of Trent. His Latin verse has remarkable elegance. A bronze statue was erected in his honor by the citizens of Padua, while his native city commemorated their great compatriot by a marble statue. His writings in prose and verse are numerous. The chief are: *Syphilidis, sive Morbi Gallici* (Verona 1530, 4to; Paris 1531 and 1539, 8vo; London 1720, 4to, and 1746, 8vo; Italian ed. Verona 1739, 4to, by Tiraboschi; Naples 1731, by Pietro Belli); *De Vini Temperatura* (Venice 1534, 4to); *Homocentricorum sive de Stellis, De Causis Criticorum Dierum Libellus* (Venice 1535, 4to); *De Sympathia et Antipathia Rerum, De Contagionibus et Contagiosis Morbis, et eorum Curatione* (Venice 1546, 4to; Lyon 1550, 54, 8vo). The collective works of F. appeared for the first time, Venice 1555, 4to.

FRACTED, a. *frāk'tēd* [L. *fractus*, broken]: in *OE.*, broken; infringed; in *her.*, broken asunder.

FRACTION, n. *frāk'shūn* [F. *fraction*, a fraction—from L. *fractiōnēm*—from *fractus*, broken in pieces]: the act of breaking; a broken part of a whole; a part of a whole or unity; in *arith.*, a part of a unit, as $\frac{1}{2}$, $\frac{1}{3}$, $\frac{2}{3}$. FRACTIONAL, a. *-shūn-āl*, pertaining to fractions.—SYN. of 'fraction': fragment; fracture; rupture; portion; part; scrap.

FRACTION, in Arithmetic and Algebra: any part or parts of a unit or whole. It consists of two members, a denominator and a numerator, whereof the former shows into how many parts the unit is divided, and the latter shows how many of them are taken in a given case. Thus, $\frac{3}{4}$ denotes that the unit is divided into four parts, and that three of them are taken; and more generally $\frac{a}{b}$ denotes that the unit is divided into b parts, and that a of them are taken. A fraction is called *proper* when the numerator is less than the denominator, and *improper* when the numerator is greater than the denominator. In Algebra, any quantity $\frac{a}{b}$ is called a fraction, although a and b are not

FRACTIONS.

necessarily representatives of whole numbers, as they would require to be if the fraction be an arithmetical fraction.

The algebraical fraction $\frac{a}{b}$ means that any quantity affected by it is to be *multiplied* by a and *divided* by b . This definition, however, through the greater generality of algebra, includes that of an arithmetical fraction. The rules for the addition and multiplication of fractions are the same in algebra and arithmetic. To add two or more fractions together, we must bring them to a common denominator, and add the numerators for a new numerator, and take the common denominator for the new denominator.

Thus if $\frac{a}{b}$, $\frac{c}{d}$ be two fractions, then $\frac{a}{b} + \frac{c}{d} = \frac{ad}{bd} + \frac{cb}{bd} = \frac{ad + bc}{bd}$, the fractions being brought to a common denom-

inator by (as a general rule) multiplying each numerator by every denominator except its own, and multiplying all the denominators for the common denominator. To subtract two fractions, we bring them to a common denominator, and subtract their numerators for the new numerator.

Thus, $\frac{a}{b} - \frac{c}{d} = \frac{ad - bc}{bd}$. To multiply two fractions together, the rule is, to multiply the numerators together for a new numerator, and the denominators together for the new denominator. Thus $\frac{a}{b} \times \frac{c}{d} = \frac{ac}{bd}$. The reasons for all these

rules are obvious. The rule of division is to invert the divisor, and proceed as in multiplication. This follows from the consideration, that to *divide* is the inverse of to

multiply, and that to divide by $\frac{a}{b}$ must be the same thing

as to multiply by $\frac{b}{a}$.

FRACTIONS, CONTINUED, in Algebra: series of fractions approximating the expression of the value of a given fraction. If $\frac{A}{B} = a + \frac{a_1}{B}$, and $\frac{B}{a_1} = b + \frac{b_1}{a_1}$, and $\frac{a_1}{b_1} = c + \frac{c_1}{b_1}$, and.... $\frac{k_1}{l_1} = m + \frac{m_1}{l_1}$, and $\frac{l_1}{m_1} = n + \frac{n_1}{m_1}$, etc.,

then $\frac{A}{B} = a + \frac{1}{b + \frac{1}{c + \frac{1}{d + \dots \frac{1}{m + \frac{1}{n + \dots}}}}}$

This expression for the value of $\frac{A}{B}$ is called a continued

fraction. If we consider the fractions (1) $\frac{a}{1}$, (2) $a + \frac{1}{b}$ or

FRACTIONS.

$\frac{ab+1}{b}$, (3), $a + \frac{1}{b + \frac{1}{c}}$ or $\frac{(ab+1)c+a}{bc+1}$, formed by taking

into account parts only of the denominator in the continued fraction, we obtain a series of fractions *converging* to the value of $\frac{A}{B}$. These converging fractions are always ap-

proximating to the value of $\frac{A}{B}$, and are alternately greater and less than it. Throughout the series, the 1st, 3d, 5th, 7th, etc., are each below the true value, while the 2d, 4th, etc., are above it; or *vice versa*, according as the original fraction is improper or proper. It can be shown that the successive converging fractions approach nearer and nearer to the true value of the continued fraction. Converging fractions are of great use in the summation of infinite series.

In illustration of the above general statement, let us take the numerical fraction $\frac{6935}{2151}$, which we first reduce to a con-

tinued fraction in the following manner: $\frac{6935}{2151} = 3 + \frac{482}{2151}$

$= 3 + \frac{1}{\frac{2151}{482}} = 3 + \frac{1}{4 + \frac{223}{482}}$ (by continuing the same process)

$3 + \frac{1}{4 + \frac{1}{\frac{482}{223}}}$

$\frac{1}{4 + \frac{1}{2 + \frac{1}{\frac{223}{61}}}}$

$\frac{1}{4 + \frac{1}{2 + \frac{1}{6 + \frac{1}{\frac{61}{5}}}}}$

$\frac{1}{4 + \frac{1}{2 + \frac{1}{6 + \frac{1}{5 + \frac{1}{7}}}}}$

$\frac{1}{4 + \frac{1}{2 + \frac{1}{6 + \frac{1}{5 + \frac{1}{7}}}}}$

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$\frac{1}{4 + \frac{1}{2 + \frac{1}{6 + \frac{1}{5 + \frac{1}{7}}}}}$

or, as it is now commonly

written, $3 + \frac{1}{1 + \frac{1}{4 + \frac{1}{2 + \frac{1}{6 + \frac{1}{5 + \frac{1}{7}}}}}}$. Here the first convergent

is 3; the second, $3 + \frac{1}{1 + \frac{1}{4}} = \frac{13}{4}$; the third is $3 + \frac{1}{1 + \frac{1}{4 + \frac{1}{2}}} = 8$

$+ \frac{2}{9} = \frac{29}{9}$; and finding the other convergents in a similar

manner, we have the following approximations to the value of the original fraction:

$$3, \frac{13}{4}, \frac{29}{9}, \frac{187}{58}, \frac{964}{299}, \frac{6935}{2151}.$$

The differences between the successive convergents and the original fraction are,

$$\frac{6935}{2151} - 3 = \frac{482}{2151} \left(\text{being less than } \frac{1}{1 \times 4} \right),$$

$$\frac{13}{4} - \frac{6935}{2151} = \frac{223}{8604} \left(\text{being less than } \frac{1}{4 \times 9} \right), \text{ etc.};$$

and in general the difference between any convergent and the original fraction is less than a fraction =

$$\frac{1}{\text{denom. of convergent} \times \text{denom. of conv. next greater'}}$$

denom. of convergent \times denom. of conv. next greater'

FRACTIONS—FRACTURE.

consequently, the differences grow less as we proceed, *ow*, ing to the denominators of the convergents always increasing. If, by actual subtraction, we find successively the difference between each convergent and the original fraction, we shall also find that they are alternately greater and less, or less and greater, according as the original fraction is proper or improper.

FRACTIONS, VANISHING: algebraical fractions in which the substitution of a particular value for the unknown quantity will make both the numerator and denominator of the fraction vanish. Thus the fraction $\frac{x^2 - 1}{x - 1}$

assumes the form $\frac{0}{0}$ when $x = 1$. The ascertainment of the value of such a fraction for the particular value of the unknown quantity which gives it the form $\frac{0}{0}$, may in all cases be effected by a general method furnished by the differential calculus. But frequently that value may be determined by simpler means, as the form $\frac{0}{0}$ arises from the existence of a factor common to both numerator and denominator, which becomes zero for a particular value of x ; if, then, we can discover this factor, either by finding the greatest common measure or otherwise, and divide it out, then by substitution we obtain the value of the fraction corresponding to the particular value of x . Thus, in the example given, we find that both terms are divisible by

$x - 1$, so that $\frac{x^2 - 1}{x - 1} = x + 1$. Therefore, when $x = 1$,

and the fraction becomes $\frac{0}{0}$, its value must equal 2. This is an example of the application of the method of Limits to the determination of the value of such a fraction, for it is clear that for every value of $x > 1$, the value of the fraction is > 2 , and continually approaches 2 as x approaches 1. Much discussion has taken place as to whether vanishing fractions have, properly speaking, values or not. —See LIMITS, THEORY OF; NOTHING; INFINITY.

FRACTIOUS, a. *frāk'shūs* [formed from prov. Eng. *fratch*, to squabble, to quarrel: partly imitative]: apt to break out into a passion; peevish; apt to exhibit ill-humor; quarrelsome. **FRACTIOUSLY**, ad. *-lī*. **FRACTIOUSNESS**, n. —**SYN.** of 'fractious': peevish; irritable; snappish; cross; waspish; pettish.

FRACTURE, n. *frāk'tūr* [F. *fracture*—from L. *fractūrā*—from L. *fractus*, broken in pieces]: a break; a broken bone: V. to break; to crack. **FRACTURING**, imp. **FRACTURED**, pp. *-tūrd*: **ADJ.** broken; cracked. **SIMPLE FRACTURE**, the breaking of a bone without the injury of the skin or adjacent soft parts. **COMPOUND FRACTURE**, a broken bone with a wound through the skin and muscles, and exposure of bone. **COMMUNUTED FRACTURE**, a bone broken into several small fragments: see FRACTURE (below).

FRACTURE of a Bone: result of accident, muscular action, or disease. The long bones of the limbs are more subject to the latter two causes than those of the head or spine. *Predisposing causes* to fracture are frosty weather, old age, cancerous disease, a morbidly brittle condition

FRACTURE.

called *fragilitas ossium*. Some bones, as the kneecap and heel-bone, are liable to give way from sudden contraction of the muscles which are inserted into them. The subject of the injury then falls, and attributes the accident to the fall, whereas it is the reverse. A medical man, a few years ago, awoke with a fit of cramp, and almost immediately his left thigh-bone broke with a snap. It reunited in the usual time. The sufferer from cancer of long standing, sometimes feels a bone give way under no special strain. In such cases, there is seldom any attempt at repair. The bones of old people are brittle from the excess of earthy materials (see BONE), and so readily give way. The bones of the feeble patient, with *fragilitas* or *mollities ossium*, are soft and friable, and when examined, are found saturated with a greasy substance. There are some persons who seem liable to fracture without any such reason. Prof. Gibson mentions a boy who, though apparently healthy, had broken his collar-bones eight times, his arm and forearm, while his leg and thigh were broken if he but tripped his foot on the carpet. An old lady once broke both thigh-bones kneeling down in church. There is one predisposing cause to fracture fortunately now seldom seen—viz., scurvy. Not only did it make the bones brittle, but, as was seen in Lord Anson's expedition, manned chiefly by pensioners, old fractures again became disunited.

Repair of a broken Bone.—Of course, as the bone lies in the midst of soft parts, any injury to the one must tear the other, and cause an infusion of blood; but the latter is speedily absorbed, and is of no service in the process of repair. After the first excitement has passed off, a fluid is effused around the fragment, which in a short time becomes converted into bone. The amount of this new material depends upon the position of the fragments; should they be far apart, or, as it is technically termed, riding, then a much larger quantity of new bone is thrown out. We see this in animals to such an extent that the materials for repair, or 'callus,' may be divided into two separate parts—a provisional callus to act as a wrapper to the bones until the permanent callus, or that which unites the ends, however far apart, becomes sufficiently hard; then the provisional callus, being no longer necessary is removed by absorption.

Symptoms of Fracture.—A broken limb hangs loose, and is, as a general rule, no longer under the control of the muscles, which, however, are pricked by the broken ends of bone, and stimulated into painful spasms, which still further displace and deform the limb. Should there be any doubt, the limb may be carefully raised and turned gently from side to side, when a peculiar rough feeling termed *crepitus* removes all doubt. Each bone, however, when broken, exhibits symptoms peculiar to itself, and requires separate treatment. Fractures are divided into *Simple*, when there is no wound in the skin which communicates with the fracture; *Compound*, when there is such a wound; *Comminuted* being prefixed to either of these terms when the bone is broken into several pieces; *Impacted*, when one fragment is driven into the other; and *Complicated*, when a

FRA DIAVOLO—FRAGA.

neighboring joint or large blood-vessels participate in the accident.

Treatment of Fracture.—Replace the fragments as nearly as possible in their natural positions by gentle extension, retain them in place by substituting an *external* rigid skeleton, made of any unyielding material which will be firm enough to resist the spasms already alluded to, but is not fastened with very great tightness to the limb. *Splints* are generally of wood or pasteboard; but of late years gutta percha has been much used. In simple fractures, it is often sufficient to adapt a bandage to the limb, which will harden on drying, and form a *shell* for it; for this purpose, starch, dextrine, and plaster of Paris are generally used. Whatever the splint be made of, it must keep the bones in a state of *complete rest*, otherwise the lymph, which would be formed into bone, stops, as it were, half way, and becomes fibrous tissue, which allows the fragments to move on each other, and is termed a false joint.

FRA DIAVOLO, *frá dē-á'vo-lo*, properly MICHELE PEZZA: 1760-1806, Nov.; b. Calabria: brigand and renegade monk. Of plebeian origin, he was first a stocking-weaver, then entered the Neapolitan army, and subsequently the service of the pope; finally, he abandoned military life, and became a monk, but being expelled for misconduct, he withdrew to the mountains of Calabria, where he headed a band of desperadoes, whose strongholds lay chiefly in the district between Itri and Terra di Lavoro. Pillage, bloodshed, and atrocious cruelties, signalized his career. For years he evaded the pursuit of justice by retiring to his haunts amid mountains and forests, and skilfully defeating, with much inferior numbers, all the armed forces dispatched against him. He became at length known among the peasantry of the neighborhood as Fra Diavolo. On the advance of the French into the Neapolitan states, F. D. and his band espoused warmly the royal interests, and in return were not only pardoned and reinstated in civil rights, but promoted to the grade of officers in the royal army, F. D. himself becoming colonel. In 1806 he attempted to excite Calabria against the French, but was taken prisoner at San Severino, and was put to death at Naples. The opera of Auber has nothing in common with F. D. but the name. He died uttering imprecations on the queen of Naples and the British admiral, Sidney Smith, whose influence had not sufficed to rescue him from death, though on his capture he produced papers bearing the royal seal, which vouched for his right to the rank of colonel in the royal forces.

FRÆNUM, n. *frē'nūm* [L. a bridle]: in *anat.*, name given to several membranous folds which bridled and retain certain organs, as *frænum linguæ*, a fold of the mucous membrane, binding down the tongue. The *Synovial fræna* are folds or duplications of the synovial membrane passing from one portion of it to another.

FRAGA, *frá'gá*: town of Spain, province of Saragossa, 63 m. w. by s. from Saragossa, on the left bank of the Cinca which is crossed by a suspension bridge. The town

FRAGARIA—FRAME.

stands on a slope, and is poor and half ruinous, with ill-paved streets. The environs abound in pomegranates and figs. The small green figs of this district are notable as particularly delicious, and when dried form the chief article of export. *F.* is supposed to occupy the site of the ancient *Gallica Flavia*. Pop. 7,028.

FRAGA'RIA: see STRAWBERRY.

FRAGILE, a. *frä'j'il* [F. *fragile*—from L. *fragilis*, brittle—from *frango*, I break: It. *fragile*]: easily broken; brittle; weak; frail. FRAG'ILELY, ad. -*li*. FRAGILITY, n. *frä-j'il'-i-ti*, brittleness; weakness; frailty.—SYN. of 'fragile': brittle; frail; frangible; feeble; weak; infirm.

FRAGMENT, n. *fräg'mënt* [F. *fragment*—from L. *fragmentum*, a piece broken off: It. *frammento*]: a part broken off; a small detached portion; an imperfect part. FRAG-MENTAL, a. *fräg-mën'täl*, consisting of fragments. FRAG-MENTED, a. broken into fragments. FRAGMENTARY, a. *fräg'mën-tër-i*, composed of fragments.

FRAGRANT, a. *frä'gränt* [L. *frāgran'tiā*, scent, odor—from *fragrans*, smelling sweetly: F. *fragrant*; It. *fragrante*, fragrant]: that smells agreeably; sweet-scented; odorous. FRA'GRANTLY, ad. -*li*. FRA'GRANCE, n. -*gräns*, or FRA-GRANCY, n. -*grän-si*, sweetness of smell; odor.—SYN. of 'fragrant': odoriferous; aromatic; balmy; spicy; ambrosial; redolent;—of 'fragrance': scent; perfume; smell.

FRAIL, a. *fräl* [F. *frêle*; OF. *fraile*, frail—from L. *fragilis*, easily broken]: weak; infirm; easily injured or destroyed; liable to err. FRAIL'LY, ad. -*li*. FRAILITY, n. *fräl'ti*, a particular fault or sin; a foible; an error; weakness of resolution or will; instability. FRAIL'TIES, n. plu. -*tiz*, faults or sins of weakness; errors; foibles.—SYN. of 'frailty': failing; frailness; infirmity; imperfection; weakness.

FRAIL, n. *fräl* [OF. *frayel*, a mat basket (see FRAIL 1)]: a kind of rush; a mat or rush basket in which raisins and figs are imported, the varying weight of such a package not exceeding 56 lb. or 70 lb.

FRAISE, n. *fräs* [F. *fraise*, a pointed stick]: in mil., a defense consisting of pointed iron or wooden spikes in a horizontal or inclined position; a *chevaux-de-frise*: see CHEVAL-DE-FRISE.

FRAISED, a. *fräzd* [F. *fraise*, a ruff]: another spelling of FRAYED: see under FRAY 2.

FRAMBOYS, or FRAMBOISE, n. *främ'boyz* [F. *framboise*, a raspberry (the fruit); *framboiser* (the bush)]: the raspberry, *Rubus idæus*.

FRAME, n. *frām* [Bret. *fram*, a framework; *framma*, to join, to unite: Ger. *rahmen*; Dut. *raem*, a frame: comp. Gael. *freumh*, a root, an origin]: a structure or design afterward to be filled up and completed; a structure formed of united parts; anything made to inclose or surround something else; that on which anything is held or stretched; order; particular state, as of the mind; in *gardening*, the covering of any kind of hotbed, flued pit, or cold pit, used

FRAME—FRAME-BRIDGE.

for the cultivation of plants not sufficiently hardy for the open air. Frames are of various materials, but generally of glass set in wood or iron, and are made in one piece or in sashes according to the size of the hotbed or pit. **FRAME**, v. to form or shape: to fit one thing to another; to compose; to draw up; to scheme out. **FRA'MING**, imp. jointing, putting together, or building up of any kind of artificers' work: for framing of timber generally, see **CARPENTRY**: for special kinds of framing, see **CENTERING**: **DOOR**: **FLOORS**: **FRAME-BRIDGE**: **PARTITIONS**: **ROOFS**: **ETC.** In such trades as mathematical, optical, philosophical, and other complex instrument making, the workman who does flat-filed work, and fits all the parts, and puts the whole instrument together, is called the *framer*, and his work *framing*. In the watch-trade, the man who frames all the parts together and builds up the watch, is called a finisher, and his work is called finishing, though it corresponds with what is called framing in other trades. **FRAMING**, n. the skeleton; the rough timber-work of a house. **FRAMED**, pp. *frāmd*, fitted and united in proper form; composed. **FRA'MER**, n. one who. **FRA'MABLE**, a. *-mā-bl*, that may be framed. **FRAMEWORK**, n. that which supports or incloses something else.

FRAME, v. *frām* [**AS.** *fremman*, to form. to effect: **Icel.** *fremia*, to bring to pass—from *fram*, forward]: to contrive; to effect; to manage; to regulate, as conduct: **N.** a contrivance. **TO FRAME A STORY OR EXCUSE**, to arrange it for the purpose in view, or to serve an end—see preceding title.

FRAME'-BRIDGE: bridge built of timbers framed together to obtain the greatest strength with a given quantity of material. The fundamental principle upon which all such construction is based, is that the timbers shall be so

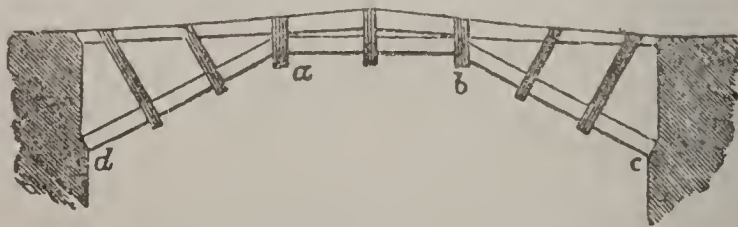


Fig. 1.

arranged that the weight put upon them shall exert a pulling or a crushing strain, instead of a transverse strain, and, if possible, that the greatest strain shall act as a direct pull in the direction of the fibres of the wood. The construction of a F. B. is very similar to that of a roof, excepting that in the bridge a considerable outward thrust upon the abutments is generally permissible, while the walls of a house will not stand this; and that for the bridge a nearly level way on the top is desirable, while for a roof a steep incline is not objectionable, or is even desirable. Fig. 1 represents a simple and useful form of frame-bridge. It will be seen at once that a weight upon the bridge will exert a pulling strain upon the horizontal timber *ab*, and a crushing strain upon *bc* and *ad*, as well as upon the upper timbers, and

FRAMINGHAM.

that the main support is in *ab*, which must be torn asunder before *ad* and *bc* can be bent or displaced to any considerable extent.

The celebrated F. B. of Schaffhausen, constructed 1757 by Grubenmann, a village carpenter, was built exactly in the manner of a roof with a horizontal pathway superadded. It was composed of two arches, one 193 ft., the other 172 ft. span. It was merely laid upon the piers, and did not abut against them to exert any outward thrust, as will be seen by fig. 2. The weight on the bridge is transmitted by the oblique beams, which by analogy we may call *rafters*, to the tie-beam *ab*, where it exerts a horizontal pulling strain. These rafters are framed into the tie-beam so as to abut firmly against it in the same manner as Roof-rafters (see ROOF). This kind F. B. is very common in Switzerland, where timber-bridges abound; and it has doubtless originated from the fact, that most of the bridges have been built by the local carpenters, who are accustomed to the construction of roofs of considerable span for the commodious square-built wooden cottages with overhanging roofs, common in that country. Frame-bridges of more complex structure are sometimes built; in some of these, the timbers

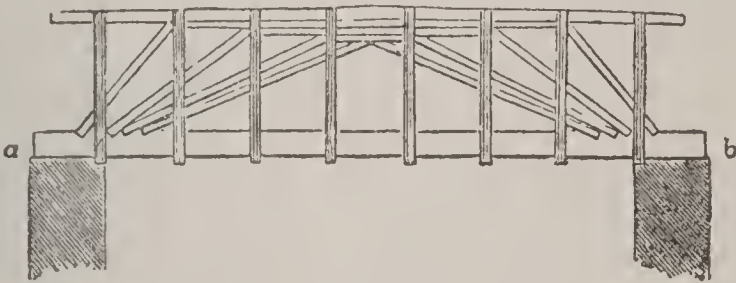


Fig. 2.

are framed so as to present an arched form. In these cases, the structure is very similar to those described and figured under CENTERING. The serious defect of all such bridges is their liability to decay from exposure to moisture, etc., especially at the joints, where water is apt to lodge and remain, from want of free circulation of air to evaporate it. In the bridge of Schaffhausen above described, it was found that when it had stood but 26 years, the oak-beams, where they rested on the masonry at *a* and *b*, fig. 2, were rotted, and the frames began to settle. This was remedied by a carpenter who raised the whole structure upon piles by means of screw jacks, and replaced the decayed wood. Means should be adapted to admit the free circulation of air in those parts where the timber rests upon the masonry, and to prevent water from settling in the timber joints. The covered bridges of Lucerne and other parts of Switzerland are well known as objects of special interest to tourists, who usually imagine that the roofs are made for the comfort of travellers, but their main object is the preservation of the bridge. In the United States, frame-bridges of several varieties abound, many being roofed.

FRAMINGHAM, *frām'ing-ham*: town in Middlesex co., Mass.; on the Boston and Albany railroad and Sudbury river;

FRAMLINGHAM—FRANCAVILLA.

22 m. w. of Boston. F. contains the villages of Centre and South F. and Saxonville, 1 national bank (cap. \$200,000), 1 savings bank, the state normal school (oldest in the United States), large woolen mills (Saxonville), carriage, straw-goods, and boot and shoe factories, public library, high school and graded schools, and 12 churches. Pop. (1870) 5,167; (1880) 6,235; (1885) 8,275; (1890) 9,239; (1900) 11,302.

FRAMLINGHAM, *frām'ling-hām*, or 'Strangers' Town,' town in the e. of Suffolk, England; on the left bank of the Ore, 14 m. n.n.e. of Ipswich. It consists of a large market-place, from which a few streets branch out irregularly. The church is of black flint and stone, and contains the monuments of Thomas Howard, third duke of Norfolk, and his duchess, and of the unfortunate Henry Howard, Earl of Surrey, and his countess. Here are the remains of a castle with 13 square towers, where Queen Mary retired after the death of her brother, Edward VI. Pop. about 4,000.

FRAMPOLD, a. *frām'pōld* [OE. *frump*, a cross old woman: W. *ffromfol*, passionate—from *ffromi*, to fret]: in OE., ill-natured; cross; peevish.

FRANC, n. *frāngk*: a French silver coin and money of account, which (since 1795, when it supplanted the livre Tournois) forms the unit of the French monetary system, and has been adopted as such also by Belgium, Italy, Switzerland, Greece, Roumania, Servia, and Spain. In Belgium and Switzerland it is known as the franc; in Italy, *lira*; in Greece, *drachma*; in Roumania, *lei*; in Servia, *dinar*; and in Spain, *peseta*. It was named from the old device on it, *Francorum Rex*, the king of the Franks or Freeman. The franc is coined of silver, nine-tenths fine, and weighs five grammes, its value being about 9½*d.* sterling, or abt. 19 cents. One pound sterling=25·2 francs. The F. is divided into 100 centimes, but the old division into 20 sous is still in common use. There are in France silver coins of ¼, ½, 1, 2, and 5 francs; and in gold pieces of 5, 10, 20, 50, and 100 francs.

FRANCAVILLA, *frān-kā-vī'llā*: town of Italy, province of Lecce, on an elevation 22 m. s.w. of Brindisi. It has a college, several convents, some manufactures. Pop. 17,000.



Franciscan Friar.



Franciscan or Gray Friar (Con-
ventual).



African Frankincense (*Boswellia
Carterii*).



Fraxinus.—Common Ash (*Fraxinus
excelsior*).



French Horn.



Fret.

FRANCE.

FRANCE, *fräns*, F. *fröngs*: most westerly portion of central Europe, from 42° 20' to 51° 5' n. lat. and from 8° 15' e. long. to 4° 54' w. long. It is bounded n. by the Channel and the Straits of Dover, which separate it from England, by Belgium, the grand duchy of Luxembourg, and the Rhenish provinces of Prussia; and on the e. by the lately annexed German provinces of Alsace and Lorraine, by several of the Swiss cantons, and by Italy; on the s. by the Mediterranean and the dominions of Spain from which it is separated by the Pyrenees; and on the w. by the Atlantic (the Bay of Biscay). The greatest length of F., from Dunkirk in the n. to the Col de Falguères in the s. is about 580 m.; greatest breadth from e. to w., from the new boundary line in the Vosges to Cape St. Matthieu in Finisterre, is about 570 m. Its circumference, inclusive of sinuosities, is estimated at nearly 3,100 m. or 5,000 kilomètres, of which nearly half is composed of maritime coast-lines, which are subdivided in the proportion of about 400 m. on the Mediterranean, 585 m. on the Atlantic, and about 570 m. on the n. frontiers. F. is divided into 87 departments, named mostly from the rivers or mountains by which they are intersected. The area of F., and Corsica, a dept. of the republic, is reckoned at about 207,000 sq. m. (For the foreign possessions of F., see below.)

OLD PROVINCES.	DEPARTMENTS.	Area in Eng. sq. Miles.	Population in 1901.
1. Ile de France....	1. Seine.....	185	3,669,930
	2. Seine-et-Oise.....	2,184	707,325
	3. Seine-et-Marne.....	2,275	358,325
	4. Oise.....	2,272	407,808
	5. Aisne.....	1,866	535,583
2. Champagne.....	6. Ardennes.....	2,627	315,589
	7. Marne.....	3,167	432,882
	8. Marne (Haute).....	2,420	226,545
	9. Aube.....	2,326	246,163
3. Lorraine.....	10. Meuse.....	2,408	283,480
	11. Meurthe-et-Moselle..	2,036	484,722
	12. Vosges.....	2,303	421,104
4. Flanders.....	13. Nord.....	2,228	1,866,994
5. Artois.....	14. Pas de Calais.....	2,606	955,391
6. Picardy.....	15. Somme.....	2,443	537,848
7. Normandy.....	16. Seine-Inférieure.....	2,448	837,824
	17. Eure.....	2,330	334,781
	18. Calvados.....	2,197	410,178
	19. Manche.....	2,475	491,372
	20. Orne.....	2,371	326,952
8. Brittany.....	21. Finisterre.....	2,729	773,014
	22. Morbihan.....	2,738	563,468
	23. Côtes-du-Nord.....	2,786	609,349
	24. Ille-et-Vilaine.....	2,697	613,567
9. Pitou.....	25. Loire Inférieure.....	2,693	664,971
	26. Vendée.....	2,690	441,311
	27. Sèvres (Deux-).....	2,337	342,470
10. Anjou.....	28. Vienne.....	2,711	336,343
	29. Maine-et-Loire.....	2,811	514,658
11. Maine.....	30. Mayenne.....	1,986	313,103
	31. Sarthe.....	2,410	422,699
12. Angoumois, Aunis, and Sain- tonge.....	32. Charente.....	2,305	350,365
	33. Charente-Inférieure..	2,791	452,149

FRANCE.

OLD PROVINCES.	DEPARTMENTS.	Area in Eng. sq. Miles.	Population in 1901.
13. Touraine.....	34. Indre-et-Loire.....	2,377	335,541
14. Orléannais.....	35. Loir-et-Cher.....	2,478	275,538
15. Nivernais.....	36. Eure-et-Loir.....	2,291	275,423
16. Bourbonnais.....	37. Loiret.....	2,629	366,660
17. Marche.....	38. Nièvre.....	2,658	323,783
18. Berry.....	39. Allier.....	2,848	422,024
19. Limousin.....	40. Creuse.....	2,163	277,831
20. Auvergne.....	41. Cher.....	2,819	345,543
21. Lyonnais.....	42. Indre.....	2,664	288,788
22. Burgundy.....	43. Vienne (Haute).....	2,119	381,753
23. Franche Comté..	44. Corrèze.....	2,272	318,422
24. Alsace (part of)...	45. Cantal.....	2,229	230,511
25. Dauphiné.....	46. Puy-de-Dôme.....	3,090	544,194
26. Languedoc.....	47. Loire.....	1,852	647,633
27. Guienne.....	48. Rhône.....	1,104	843,179
28. Gascony.....	49. Ain.....	2,248	350,416
29. Bearn and Na-	50. Saône-et-Loire.....	3,330	620,360
30. varre.....	51. Côte-d'Or.....	3,391	361,626
31. Foix.....	52. Yonne.....	2,892	321,062
32. Roussillon.....	53. Saône (Haute).....	2,070	266,605
33. Avignon, Venais-	54. Jura.....	1,951	261,288
34. sin, and Orange	55. Doubs.....	2,052	298,864
35. Provence.....	56. Belfort, dist. of.....	235	92,304
36. Corsica.....	57. Isère.....	3,178	568,693
37. Savoy.....	58. Drôme.....	2,532	297,321
38. Nice.....	59. Alpes (Hautes).....	2,178	109,510
	60. Ardèche.....	2,144	363,501
	61. Loire (Haute).....	1,930	314,058
	62. Lozère.....	1,996	128,866
	63. Gard.....	2,270	420,836
	64. Hérault.....	2,402	489,421
	65. Tarn.....	2,231	332,093
	66. Garonne (Haute)....	2,457	448,481
	67. Aude.....	2,448	313,531
	68. Aveyron.....	3,385	382,074
	69. Lot.....	2,017	226,720
	70. Dordogne.....	3,550	452,951
	71. Tarn-et-Garonne....	1,440	105,669
	72. Lot-et-Garonne.....	2,078	278,740
	73. Gironde.....	4,140	821,131
	74. Landes.....	3,604	291,586
	75. Gers.....	2,423	238,448
	76. Pyrénées (Hautes)...	1,750	215,546
	77. Pyrénées (Basses)...	2,977	426,347
	78. Ariège.....	1,892	219,641
	79. Pyrénées (Orientales)	1,598	212,121
	80. Vaucluse.....	1,381	236,949
	81. Rhône (Bouches-du-).	2,025	734,347
	82. Alpes (Basses).....	2,697	115,021
	83. Var.....	2,333	326,384
	84. Corse.....	3,367	295,589
	85. Savoie.....	2,388	254,781
	86. Savoie (Haute).....	1,774	263,803
	87. Alpes Maritimes.....	1,443	293,213
	Total.....	207,054	38,961,945

By the treaties with Germany 1871, F. lost 5,589 sq. m. of land, and 1,597,228 inhabitants, comprised within 1,689 communes, and distributed over five departments. These losses included the whole of the old dept. of the Bas-Rhin,

FRANCE.

two arrondissements with a fraction of the third (Belfort) of the dept. of the Haut-Rhin, the greater portion of the dept. of the Moselle, together with a number of canton and communes in the dept. of the Meurthe and Vosges. The portions of the two depts. of the Meurthe and Moselle remaining to F. have been incorporated into one.

Colonies and Foreign Possessions.—The possessions of F. beyond Europe cover an area of 4,072,076 sq. m., including protectorates and spheres of influence, and including also Algeria, which is considered not as a colony, but as a part of F.

AREAS AND POPULATIONS, ACTUAL AND ESTIMATED (1901).

Possessions.	Year of Acquisition	Area in Square Miles.	Population.
<i>In Asia:—</i>			
India	1679	196	273,000
Annam	1884	52,100	6,124,000
Cambodia.....	1862	37,400	1,500,000
Cochin-China.....	1861	22,000	2,968,600
Tonking and Laos.....	1884-93	144,400	7,641,900
Total of Asia		256,096	18,507,500
<i>In Africa:—</i>			
Algeria	1830	184,474	4,739,300
Tunis.....	1881	51,000	1,900,000
Western Sahara.....		1,544,000	2,550,000
Senegal.....	1637-1880	80,000	1,800,000
Senegambia and Niger	1893	210,000	3,000,000
French Guin�ea	1843	95,000	2,200,000
Ivory Coast.....	1843	116,000	2,000,000
Dahomey	1893	60,000	1,000,000
Congo.....	1884	1,160,000	10,000,000
Somali Coast and Depend�ncies.....	1864	45,000	200,000
Reunion.....	1649	966	173,200
Comoro Isles.....	1886	620	47,000
Mayotte.....	1843	140	11,640
Madagascar.....	1643-1896	227,950	2,505,240
Total of Africa		3,775,150	32,126,380
<i>In America:—</i>			
Guiana.....	1626	30,500	32,910
Gaudeloupe.	1634	688	182,110
Martinique.....	1635	380	203,780
St. Pierre and Miquelon.....	1635	92	6,250
Total of America.....		31,660	425,050
<i>In Oceania:—</i>			
New Caledonia and Depend�ncies	1854-87	7,650	51,410
Establishments in Oceania....	1841-81	1,520	29,000
Total of Oceania.....		9,170	80,410
Grand total.....		4,072,076	51,139,340

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Population.—For the elements that compose the French population, Celtic Gauls, Belgæ, Aquitanions or Iberians, Romans, Franks, and other Germanic tribes, and Normans, see the section below on the history of France, and separate titles, such as BELGÆ: FRANKS: etc. For the dominant language of France, see FRENCH LANGUAGE AND LITERATURE. For the Provençal language of the south of France, see that title. In the n.w. the ancient Celtic Breton tongue still survives (see BRETAGNE: CELTIC NATIONS); and in the s. w. the distinct and peculiar Basque language is spoken by the bulk of the people in more than one dept. (see BASQUE PROVINCES). Flemish is spoken in French Flanders; the Walloons (q.v.) speak their own Romance dialect in the n.e. of F.; and German is still spoken on the French borders of Alsace, now incorporated with Germany. Of actual foreigners resident in F. 1891, there were in all 1,101,728; of whom 482,681 were Belgians, 264,568 Italians, 100,114 Germans, 79,550 Spaniards, 78,584 Swiss, 36,134 Englishmen.—The pop. has not exhibited the same rate of increase as other first-class European powers during the present century, for while the pop. of Great Britain has nearly doubled within the last fifty years, that of F. shows an increase of only about 12 per cent. In 1885 the birth-rate was only 2·49 per 100 inhabitants, a rate lower than that of any other European country.

The following table shows the pop. 1801-1901:

Year of Census.	Number of Population.	Annual Increase.
1801.....	27,349,003	149,941
1806.....	29,107,425	351,685
1821.....	30,461,875	90,292
1826.....	31,858,937	279,415
1831.....	32,569,223	171,787
1836.....	33,540,901	194,337
1841.....	34,217,719	135,362
1846.....	35,400,486	236,553
1851.....	35,783,170	76,537
1856.....	36,039,364	51,236
1861.....	37,382,225	268,572
1866.....	38,067,094	136,186
1872.....	36,102,921	
1876.....	36,905,788	128,310
1886.....	38,218,903	
1891.....	38,343,192	25,558
1896.....	38,517,957	174,765
1901.....	38,961,945	443,988

The decline of population between the census of 1866, May, and of 1872, May, was 1,964,273, of which 1,597,228 was due to the loss of the different territories annexed to the German empire. The remainder was due partly to losses in the war, and partly to actual decrease in the pop. of 73 departments. The greatest increase on record was in the period 1896-1901.

Chief Cities.—As in other European countries, the population of F. is crowding together into the towns. In 1846, the rural population constituted 75·58 per cent. of the whole, the urban 24·42; in 1876, 65·10 and 34·90 respectively. Of the total increase of pop. 1876-86 more than two thirds belonged to the 41 French towns of more than 40,000 inhabitants. The largest cities of F. 1901 were:

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Paris.....	2,714,068	Rouén.....	116,316	Tourcoing.....	79,242
Marseille....	491,161	Reims.....	108,385	Montpellier....	75,590
Lyon.....	459,039	Nice.....	105,109	Rennes.....	74,676
Bordeaux....	257,633	Nancy.....	102,559	Dijon.....	71,326
Lille.....	210,696	Toulon.....	101,602	Grenoble.....	68,615
Toulouse....	149,841	Amiens.....	90,758	Orléans.....	67,311
St. Etienne..	146,559	Brest.....	84,284	Tours.....	64,695
Roubaix....	142,365	Limoges.....	84,121	Le Mans.....	63,272
Nantes.....	132,990	Angers.....	82,398	St. Denis.....	60,808
Le Havre....	130,196	Nîmes.....	80,605	Calais.....	59,743

Coast, Islands, and Frontier.—The n.n.w. coast is generally irregular, indented with numerous bays, the principal of which is the Bay of St. Malo, the archipelago of Bréhat, etc. The w.s.w. coast is more lofty and precipitous, and is interspersed with isolated rocks and promontories; while s. of the Loire it is low, and lined with salt marshes to the foot of the Pyrenees, where it again assumes a rocky character. Here lie the islands of Ushant (Ouessant), Belleisle, Noirmoutier, Isle d'Yeu, Ré, Oléron, etc. The coast of the Mediterranean, which is broken by lagoons or shore-lakes, is low till it has passed Toulon, after which it becomes bolder. The only islands off the shore are the Hyères, near Toulon; the larger island of Corsica (q.v.) lies n. of Sardinia. The Mediterranean here forms two bays or gulfs, the Gulf of Lyons and the Gulf of Genoa which belongs only in part to France. The land frontiers of F. are formed on the side of Spain by the Pyrenees; on that of Italy and Switzerland, by the Alps and Jura chain; on the n.e., the frontier line is unprotected by natural boundaries, and since the loss of Alsace and Lorraine is not defended by the same celebrated fortresses as before the war of 1870-1. Other military defenses however have been provided.

Plains, Mountains, and Rivers.—The chief plains are those of Burgundy, and of the oceanic district, embracing the lower basins of the Seine, Loire, and Garonne. F. has four great mountain chains—the Pyrenees (q.v.), which separate the French territory from Spain; the Cevenno-Vosgian range, formed of the Cevennes (q.v.), running e. and w. between the Rhone and Loire, and the Vosges, running n. and s. between the Moselle and the new boundary line; the Alps (q.v.), which separate the Swiss territory from the provinces of Savoy and Nice; and the Sardo-Corsican range, which belongs, as the name implies, to the islands of Sardinia and Corsica. The highest peaks in the Pyrenees are the Maladetta and Mont Perdu (10,886 ft. and 10,994 ft.); in the Cevenno-Vosgian range, the greatest height (the Widderkalm) does not greatly exceed 7,000 ft. The French portion of the Alps now includes several of the highest mountains and most elevated passes of the range, as Mont Blanc, 15,744 ft.; Mont Isèran, 12,272 ft.; Mont Cenis, 11,457 ft.; and the pass of Little St. Bernard, 7,190 ft. etc. In Corsica, the highest peak rises to an elevation of 9,000 ft. The grand water-shed of F. is the Cevenno-Vosges chain, which determines the direction of the four great rivers, the Seine, the Loire, the Garonne, and the Rhone; the first three of which flow n.w. into the Bay of Biscay or the English Channel, and the fourth into the Gulf of Lyons. Besides these, the more important streams

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are the Moselle, Meuse, and Scheldt or Escaut (all of which soon leave France, and flow into the Netherlands, or Germany); the Somme and Orne (belonging to the basin of the Seine; the Vilaine and the Charente (belonging to the basin of the Loire); the Oise, the Aube, the Yonne, and the Marne, chief affluents of the Seine; the Sarthe, the Loiret, the Allier, and the Maine—of the Loire; the Dordogne, the Lot, the Tarn, and the Adour—of the Garonne; and the Saône, the Isère, and the Duranee—of the Rhone.

The entire extent of river navigation in F. amounts to 5,500 m., or 8,900,000 mètres, while the 99 larger canals, which have been constructed either to connect these river-courses or to supply entirely new channels of water-communication, extend over a length of 2,900 m., or 4,700,000 mètres. The most important of these works are the canals connecting Nantes, and Brest, and the Rhone with the Rhine, and those of Berry, Nivernais, and Bourgogne. F. contains only one lake of importance, Le Grand-Lieu, a little s. of Nantes, which has an area of about 14,300 acres; but the country abounds in salt marshes or ponds, especially in the districts of Gascony, Roussillon, and Languedoc.

F. is peculiarly rich in mineral springs, of which there are said to be nearly 1,000 in use. Of these, more than 400 are in the group of the Pyrenees, where there are 93 establishments for their systematic use. It is estimated that there are, moreover, fully 4,000 springs not hitherto employed.

Geology, etc.—F. presents a great variety of geological formations, but though there is an almost complete succession of all the stratified and non-stratified formations, they are distributed with great inequality: For instance, while nearly one-third of the soil is composed of tertiary formations, a very small fractional part is made up of coal-beds. A belt of primary rocks, forming the skeleton of some portions of the Vosges, Alps, and Pyrenees, and of the great Plateaux of Brittany and La Vendée, encircles the great central basin in which rises the volcanic formation of the mountains of Auvergne, with their extinct craters, lava-streams, etc. The space between this external breast-work and its volcanic nucleus is occupied by secondary and tertiary formations. Alluvial deposits are in all the valleys, but they occur in extensive beds only in the neighborhood of Dunkirk and Niort, and on the borders of the Mediterranean. According to M. Maurice Block's estimate, the physical and agricultural character of the soil of F. may be comprised under the following heads.

	Hectares.
Mountainous districts, heaths, and commons.....	9,944,839
Rich land	7,276,369
Chalk or lime districts	9,788,197
Gravel, stony, and sandy.....	15,951,618
Clay, marshy, miscellaneous.....	9,807,577

52,768,600

The same writer further subdivides the soil of F. according to its actual employment under the following heads:

	Per cent of the whole area.
Arable lands.....	48·3
Meadow lands.....	9·7
Vineyards.....	3·7
Cultivated lands	17·8
Roads, streets, public walks, etc.....	3·7
Forests and unproductive lands.....	16·8

Climate.—F. has one of the finest climates in Europe, though owing to its great area, it has considerable diversities of temperature; for instance, the n.e. parts have a continental, and the n.w. parts an oceanic climate, resembling those of Germany and Great Britain; while the Mediterranean districts are exposed at times to the ravages of the burning winds which have passed over the deserts of Africa, and to the destructive n.w. wind known as the *mistral*, which often does great injury to the fields near the mouth of the Rhone and Var. The mean annual temperature of different parts of F. has been estimated as follows by Humboldt: Toulon, 62° F.; Marseille, 59·5°; Bordeaux, 56°; Nantes, 55·2°; Paris, 51·2°; Dnnkirk, 50·5°.

Products.—Of the vegetable products of F., which, from varied climatic and geognostic relations, are necessarily characterized by great abundance and diversity, the most generally cultivated are the cereals, the vine, chestnuts, olives, culinary fruits and vegetables, hops, beet-root for the manufacture of sugar, tobacco, madder, chicory, flax, etc. The dairy industry has grown of late very rapidly. In 1833 France imported 1,200,000 kilogrammes of butter, and exported only 1,000,000. Since 1880, she exports from 34 to 35 millions of kilogrammes per annum, and receives in return (especially from England) more than 100 millions of francs. Wheat is largely imported, though its cultivation has increased during the last 50 years; that of rye, barley, and maize has had little variation; while the growth of potatoes has been most extensively augmented. The following table shows the fluctuations in these agricultural products:

EXTENT OF LAND OCCUPIED IN 1845, '79, '90, AND '94 (IN HECTARES).

	1845.	1879.	1890.	1894.
By Wheat	5,743,135	6,920,000	7,061,739	6,991,449
“ Rye.....	2,500,000	2,100,000	1,588,632	1,555,723
“ Barley and Oats...	1,200,000	5,103,000	4,658,254	4,771,713
“ Maize.....	730,000	610,000	595,021	578,275
“ Potatoes.....	925,000	1,266,000	1,461,757	1,540,521

QUANTITY YIELDED IN 1845, '79, '90, and '94 (IN HECTOLITRES).

	1845.	1879.	1890.	1894.
By Wheat.....	71,963,280	80,900,000	116,915,880	122,469,207
“ Rye.....	30,000,000	24,000,000	24,170,317	26,406,900
“ Barley and Oats.	18,400,000	92,000,000	110,792,568	108,953,142
“ Maize.....	8,000,000	7,600,000	8,964,915	9,662,407
“ Potatoes	77,900,000	102,000,000	110,397,993*	128,200,939*

* Quintals.

The mean annual yields of these productions is estimated as follows: Wheat, 73,000,000 hectolitres; rye, 22,000,000 hectolitres; barley and oats, 40,000,000 hectolitres; maize, 9,100,000 hectolitres; potatoes, 95,000,000 hectolitres. (The hectolitre = 2·75 bushels). The subdivision of farms, the short leases (less than 10 years) on which the majority are let, and the small number of the great land-owners who reside on their estates, have tended to check the progress of

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agriculture in France. Agricultural exhibitions have been held since 1850. 360,000 francs are annually given in prizes, etc.; and there are now nearly one thousand agricultural associations in different parts of France.

The manufacture of sugar from beet-root, which took its origin during the great wars of the early part of the century, has been prosecuted with much vigor during the last 50 years, and about 150 millions of kilogrammes are annually manufactured. (The kilogramme = 2.2 lbs. avoirdupois.) Since the appearance of the vine disease, beet-root has been extensively employed in the manufacture of alcohol. In 1893-4, there were more than 514,000 tons of beet-root sugar produced. The cultivation is almost limited to the n. and e.; hemp and flax are grown chiefly in the northern, but also in the s.-western departments. The entire production of hemp was estimated 1842 at 57,507,076 kilogrammes, worth 86,287,300 francs; and that of flax at 36,875,400 kilogrammes, worth 57,507,400 francs. The production of hemp in 1894 was: seed, 13,327,900 kilogrammes; fibre, 28,421,400 kilogrammes; the production of flax was: seed, 16,718,300 kilogrammes; fibre, 24,195,800 kilogrammes. The foreign flax imported in 1894 was valued at 52,000,000 francs, or about \$10,400,000. The cultivation of the mulberry-tree is important in the production of silk. In 1858, the dept. du Gard had monopolized nearly half the mulberry culture, which in its aggregate amount has continued unchanged. The production of silk, which began with the 17th c., in 1790 had reached such vast dimensions that the produce then was 6½ million kilogrammes of cocoons, worth 16½ million francs. Since that period, it has had great variations. From 1840-53, the production increased steadily from 17 to 26 millions of kilogrammes; but the diseases to which the silkworm has since been liable so much reduced the yield of silk that in 1857 it hardly amounted to 7 millions of cocoons. The disease has, however, gradually abated. In 1894, 154,733 persons were employed in the silk industry; the production of cocoons was 10,584,491 kilogrammes; 252,514 kilogrammes of cocoons were exported, valued at 108,164,746 francs.

The vine has, from a very early period, been one of the principal sources of the agricultural wealth of France. The choicest wines are grown in the Bordelais, Burgundy, and Champagne, but some excellent kinds are produced on the banks of the Loire and in some of the s. departments. The breadth of soil devoted to this culture fluctuates, but may be stated at about 2,000,000 hectares. The mean produce for every hectare was (1788) 21 hectolitres 21 litres; (1829) 27 hectolitres 20 litres; (1850) 32 hectolitres 35 litres. Some time ago, the fungus known as the oïdium attacked the vine and inflicted such serious damage on the plant, that in 1854 (the worst year) the hectare yielded 5 hectolitres instead of the average 23 hectolitres. A new and very destructive vine disease, occasioned by an insect called the *Phylloxera vastatrix* appeared in the s.e. of F. 1865, and by 1873 had established itself in 12 departments. In 1877, 28 depts. had suffered; and in 1880, more than 40. The following are annual yields of wine:

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	Hectolitres.		Hectolitres.
1808.....	28,000,000	1877.....	56,000,000
1848.....	51,622,150	1880.....	29,000,000
1874.....	63,146,000	1901.....	60,074,110

The average yearly produce of the vineyards of F. is estimated at about 50 million hectolitres (about 1,000 million gallons). Of this, about $\frac{1}{7}$ is made into brandy. F. consumes nearly all the wine raised on her soil, the annual exports being on an average little more than 2 millions of hectolitres, valued at about 218 millions of francs.

The principal forest-trees are the chestnut and beech on the central mountains, the oak and cork trees in the Pyrenees, and the fir in the Landes. The destruction of the national forests has been enormous within the last two centuries, but measures have been taken in recent years to plant wood to protect mountain slopes exposed to inundations from alpine torrents, and to provide a supply for the ever-increasing demand of wood for fuel. About one-seventh of the entire territory of F. is still covered with wood. Turf taken from the marshy lands is extensively used, especially in the rural districts, for fuel.

Animals.—F. is not so well stocked with domestic animals as her great resources might indicate. During the 50 years 1812–62, the numbers of horned cattle were almost doubled. In 1901 there were in F., in exact numbers, 2,026,382 horses, 554,952 asses and mules, 14,673,810 horned cattle, 19,669,682 sheep, 6,758,198 swine, and 1,529,280 goats. In 1886, there were 3,000,000 bee-hives, the produce of which had a total value for that year of 24,000,000 francs. Poultry is an important item of farm produce in F., estimated at 45 millions of francs; while the eggs and feathers yield 35 millions of francs. The wild animals are fast diminishing; the lynx is rarely seen, even among the higher alpine regions, but wolves are still numerous in the mountainous districts of the central depts.; while the chamois and wild-goat, as well as the marmot, ermine, and hamster, are found among the Pyrenees, Alps, and Vosges. The wild-boar, roebuck, fox, squirrel, polecat, and marten are found in the woods. The red and fallow deer are scarce; hares and rabbits abound; and game generally is plentiful. The wanton destruction of small (singing) birds having been found conducive to the excessive increase of noxious insects, stringent municipal enactments are being put into force for the protection of those birds.

Fisheries.—The French govt. expends between three and four million francs annually in aiding those engaged in the great fisheries. The value of the exports of fish from F. (12 million francs) is little more than half the value of the imports. There are no official reports of river and other fresh-water fishing in F.; or of the minor fisheries along the coasts, which constitute the principal means of occupation and support of the majority of the local population. Pilchards and mackerel are caught in large quantities off Normandy and Brittany. The w. coasts have extensive oyster and mussel beds; tunnies and anchovies are caught on the shores of the Mediterranean. The total

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catch of the French fisheries, 1901, was 402,304 metric quintals. French boats fish in the North Sea and along English e. coast, at the Newroundland fisheries, and off the coast of Iceland. Pisciculture (q.v.) is successfully prosecuted in France. About 85 per cent. of French oysters are derived from four or five breeding-grounds. Nearly 100 million oysters are annually produced.

Mineral Products.—The chief mineral products are coal and iron, on which about 250,000 men are employed. F. has several considerable coal-beds, principally in the e.s.e. and north. The coal supply hitherto has not equalled the demand; though in several years of the decade 1870—80, it rose to the enormous amount of 170 million quintals. (The quintal = 1·97 cwt.). Notwithstanding this home-supply, it was necessary to import many million quintals to meet the increased annual demand, which before the late war, had risen above 200 million quintals, while in 1852 it was still under 120 millions. The iron mines of F. are of excellent quality, but their distance from the fuel necessary for the working of the mineral renders them of relatively small value. In 1900 there were 511 mines in operation, 180,976 workers; the product was: coal and lignite, 33,404,298 tons; iron ore 5,447,694 tons; pig iron, 2,714,298 tons; finished iron, 708,274 tons; steel 1,226,537 tons. F. imports iron from Switzerland, Germany, Belgium, and England. Argentiferous galena, a little silver and gold, copper, lead, manganese, antimony, and tin occur, but hitherto their working has not proved productive. The dept. of Charente-Inférieure yields the largest amount of salt, the mean annual produce being 1½ million quintals (2½ million francs), fully one-third of the entire annual product of the country. F. derives about 41 million francs from its quarries of granite and freestone, its kaolin, marbles, sands, lithographic stones, millstones, etc. Granite and syenite are found in the Alps, Vosges, Corsica, Normandy, and Burgundy; porphyry in the Vosges, and basalt and lava for pavements in the mountains of Auvergne, Marble is found in more than 40 depts, alabaster occurs in the Pyrenees; the largest slate-quarries are near Cherbourg and St Lô.

The following list gives an approximative estimate of the value of the chief products of French industry:

	Millions of Francs.
Linen fabrics.....	250
Cotton “	650
Woolen “	950
Silk “	1000
Mixed “	330
Jewelry, watchmaking.....	35
Gilt-wares.....	12
Minerals, mines, salt, etc.....	600
Articles of food—as sugar, wines, etc.....	364
Skins, leather, oils, tobacco.....	556
Bone, ivory, isinglass, etc.....	30
Chemical products.....	80
Ceramic arts.....	86
Paper, printing.....	60
Forests, fisheries.....	98

Industry, Trade.—The principal seats of industry are as

follows: For textile fabrics, the depts. Le Nord, La Sarthe, Maine-et-Loire, Seine-Inférieure, Le Calvados, Seine-et-Oise, Ille-et-Vilaine, etc. F. is unrivalled for silk-manufactories, the finest of which are at Lyon, Tours, and Paris; while St. Etienne is the special seat of the ribbon trade. Alençon, Bailleul (frabricating the so-called *Valencienne*), Lille, Arras, Caen, and Bayeux, all are famous for their laces and blonds, which alone employ 250,000 persons. Rheims is conspicuous for *merinos* and fine flannels; Amiens and Nancy for fine printed woolen goods: Lodève and Elbœuf for army cloths. Gloves are made at Grenoble, Paris, etc. The best carpets are made at Aubusson, Abbeville, and Amiens. Paris is the seat of industry for some of the most costly fabrics, as Gobelins tapestry, shawls of great value, watches, clocks, articles of *vertu*, carriages, philosophical instruments, etc. Sèvres is unrivalled for china and glass. St. Gobain and St. Quirin manufacture looking glasses of the largest size.

The trade of F. is inferior only to that of England and the United States. The great emporiums of trade are Paris, Lyon, St. Etienne, Lille, Rheims, Nîmes, Toulouse, St. Quentin, Orleans, Avignon, Montpellier, etc.; and the most active maritime ports are Marseille, Cette, Havre, Bordeaux, Nantes, Rouen, Calais, Dunkirk, Boulogne, Dieppe, etc. These centres of trade all have suffered at different periods during the present century.

In French statistics general commerce includes all goods entering or leaving France, while special commerce includes only imports for home use and exports of French origin. In the 'general' commerce (1901) the imports amounted to \$1,121,240,000; the exports to \$1,043,940,000. In special commerce the same year the imports amounted to \$873,840,000; the exports to \$802,580,000. The principal sub-divisions of the special commerce were: Imports, food products, \$156,000; raw products, \$562,600,000; manufactured goods, \$154,400,000. Exports, food products, \$149,000,000; raw products, \$203,600,000; manufactured goods, \$450,000,000. The leading articles of export from F. are silk manufactures, woolen manufactures, sugar, butter, cheese, eggs, wine, etc.

Merchant navy of F. numbered (1901) 1,299 steamers, of 546,541 tons, and 14,393 sailing vessels, of 564,447 tons; 107,215 vessels of 26,016,882 tons entered French port, of which 20,340 were foreign vessels. Internal and coasting trade is a great source of wealth to the state.

Railways, etc.—According to the official report the railways in operation (1901) measure 25,500 m., including 1,700 m. owned by the government. The railways of F. are for the most part held by private corporations, under the superintendence of the state, from which they receive subsidies of about \$100,000,000. In 1900 the length of line of 'general interest' open for traffic was 23,701 m., which cost to construct \$3,288,400,000. The receipts during that year were \$303,370,000, and the expenses, \$174,830,000. Number of passengers carried 453,193,000; total amount of freight 126,830,000 tons. On 1902, Jan. 1, there were 2,304 miles of street railways.

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Total receipts of all the lines (1858), 334,769,469 francs; number of passengers conveyed by rail, 37,952,398. In 1865, the number of passengers was 81,533,061. For the number of passengers carried in 1900 and tons of goods see above. By a clause in the treaty of 1871, the whole of the lines of the Eastern Company in Alsace Lorraine, about 700 kilomètres in length, were sold to the imperial govt. of Germany for 325 million francs.

The creation of the first highroads in F. is referred to Philippe Auguste; and their more perfect organization in the 16th and 17th c., to Henry IV. and Louis XIV. Under Napoleon I. there were 125 highroads, extending in all over 30,000 kilomètres (18,600 m.); and in 1901 there were more than 38,200,000 k. (23,910 m.) of nat. roads.

Postal Service.—The postal service dates back to 1464, when Louis XI. placed it under the direction of the state. Since 1848, a system of low prepayment for letters has been established. In 1900 there were in F. and Algeria 10,852 post-offices; 70,000 letter-boxes. The postal receipts for F. alone were 270,390,562 francs, expenditure (including telegraphs), 201,680,955; ordinary letters carried, 1,156,714,000; registered letters, 53,604,000; postal cards, 65,229,000; printed matter, samples, etc., 1,409,250,000; total, 2,579,797,000.

Electric Telegraph.—The first electric telegraph in F. was constructed 1844. In 1880, there were 41,220 m. of lines, including submarine and subterranean lines. In 1901 the total length of telegraph lines was 87,382 m., and of wire 328,700 m.; telegraph offices 12,946; telegrams (1900) 50,486,435.

Constitution, Government.—1870, Sep. 4, the emperor, Napoleon III., was declared no longer the head of the state, and France was proclaimed a republic. At the close of 1872, the supreme power was vested in a National Assembly, with whom rests the nomination of the chief officer of the state, bearing the title of 'President of the French Republic;' and nominated for seven years. This officer, as chief of the executive power, but under responsibility to the National Assembly, is authorized to promulgate and insure the proper execution of all laws and ordinances transmitted to him by the president of the Assembly. By the law of 1875, Feb. 25, the National Assembly is to consist of two bodies—the Chamber of Deputies and the Senate. The deputies are elected by universal suffrage; the senate consists of 300 members, of whom 225 are elected by the depts. and colonies, and 75 by the National Assembly. The budget adopted 1896 made the total ordinary receipts and expenditures for France and Algeria, each about \$690,000,000; expenditure on account of the public debt \$243,958,407. The president of the republic has the right of appointing the judges, commanding the forces, and maintaining relations and settling treaties with foreign states, in respect to which acts he is responsible to the assembly. He appoints and dismisses the ministers of state, who are responsible also to the assembly, and he may reside at the seat of the National Assembly, and,

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provided he gives notice of his intentions, may take part in its deliberations. His salary was fixed 1873 at 600,000 francs (abt. £24,000, or \$116,000), with an extra allowance of 162,000 francs (abt. \$31,000) for household expenses. The president is elected for 7 years; the successive presidents have been M. Thiers; till 1873; 1873-79, Marshal MacMahon; 1879-87, F. J. P. Jules Grévy; 1887-94, Sadi Carnot (assassinated 1894, June 25); 1894, June—1895, Jan., Jean Casimir-Perier; 1895—1898, Félix Faure; 1898— —, Emile Loubet.

The ministry is presided over by 11 ministers of state, each in a definitely limited sphere of administrative duty and authority; and in addition, the president is assisted in the government by a Council of State, 'Conseil d'Etat,' which, according to a decree of the National Assembly, is to consist in all of 43 members, 15 of whom may be nominated by the president, while the remaining 28 are selected by the assembly. The functions of this body are restricted to giving advice on bills presented to the National Assembly by the president or the ministers.

Departments, etc.—F. was (1902) divided into 87 *departments*, comprising 362 *arrondissements*, 2,908 *cantons*, and 36,192 *communes*. Each dept. is presided over by a *préfet*, nominated by the pres. of the republic on the presentation of the minister of the interior each *arrondissement* by a *sub-préfet*; each *canton* by a member of the gen. council of the dept., which meets annually for whatever period may be decreed by the head of the state and every *commune* has its *maire* and municipal council. Every chief town of a *canton* has its commissary of police; in the larger towns, there must be one of these officers to every 10,000 inhabitants. The administration of justice is presided over by a special minister of state, who is keeper of the seals. A supreme tribunal serves as a court of appeal from the lower courts. The tribunals of commerce and police, together with those of the several depts., take cognizance of the various civil and criminal cases specially falling within their several spheres. There are 357 tribunals of the *arrondissements*, or *tribunaux de première instance*, divided into six classes; 2,681 police courts; 216 tribunals of commerce; 26 courts of appeal, divided into four classes; a *Cour de Cassation*, divided into three chambers, which confirms or annuls the sentences of the police and assize courts; and a *Haute Cour de Justice*, which gives final judgment in all cases of offense against the state. Assizes are held every three months in 59 towns; and, independently of the ordinary judicial magistrates, the courts of assize are composed of juries of 12 men, chosen in accordance with certain prescribed regulations. In the maritime and commercial towns there were, under the empire, 85 councils of *prud'hommes* (experienced men) with summary jurisdiction in matters to the amount of 200 francs. These councils, which are composed of master-workmen elected annually, decide on causes of dispute, chiefly in regard to questions of wages and differences between masters and men. The state is charged 35½ millions of

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francs for the expenses incident to the ministry of justice, according to the budget for 1882. There are 387 departmental prisons, 21 central houses of detention, 2 political prisons at Doullens and Belleisle, and numerous penitentiaries and reformatories for the young. All these prisons, excepting the two for political offenders, are in part self-supporting. The only hulks, *bagnes*, remaining are at Toulon, where convicts of a certain class undergo their sentences, but the principal penal settlement is in French Guiana (q. v.).

Religion, Churches.—No person can be molested in F. on account of his religious opinions, provided the manifestation of them does not disturb the public peace as established by law. The public exercise of any special form of religion must, however, be preceded by the official authorization of the *préfet*, or in special cases, by higher authority. The *recognized* forms of faith are—the Rom. Cath., the Prot. (including the Reformed and Lutheran), the Jewish, and, for Algeria, the Mohammedan. The clergy of these religions are paid by the state. The Rom. Cath. Church comprises the great majority of the people, 78.50 per cent. in 1881. Of the total pop. of 33,218,903, Protestants number 692,800 (1.8 per cent), mostly Calvinists, with some Lutherans; 53,500 are Jews; and no less than 7,684,900 persons ‘declined to make any profession of religious belief.’ There were further 33,000 of ‘various creeds.’

The state appropriated the funds of the church in 1780, and undertook to maintain public worship. In 1803, the maintenance of religion cost 4,100,000 francs; in 1813, 17,000,000; in 1854, 44,000,000. In 1900, the sum for France proper was 43,006,978, thus apportioned: for Rom. Cath. Church, 41,045,923; Prot. Churches, 1,495,100; Jewish worship, 206,530; for Algeria: Rom. Cath. 829,700; Prot., 97,600; Jews, 28,970; Mussulmans, 307,430; total, 44,270,678. The archbishops and bishops of the church of F. are nominated by the pres. of the republic, and canonically inducted by the pope. There are 84 Rom. Cath. prelates—17 archbishops, 67 bishops. The abp. of Paris receives 50,000 francs per annum; the other archbishops, 20,000 francs; the bishops, 15,000 francs. Several French prelates hold the rank of cardinals; and there are over 750 canons belonging to the various cathedral chapters. About 3,500 *curés* or parochial clergy (receiving from 1,200 to 1,500 francs) are inducted by the bishops, with approval of the state: there are also 10,000 *vicaires* (curates), and 30,000 *desservants*.

In 1900 the National Assembly adopted a measure known as the Associations Law. Its purpose was to compel all religious orders to apply for authority to conduct schools. In 1902 about 3,000 schools, mainly for girls, and taught by nuns, still defied the law. A decree, therefore, was issued ordering these to close within a week, or the troops would close them. Considerable violence resulted in different parts of F., particularly in Brittany, before the decree was finally carried out. The archbishop of Paris and many bishops made vigorous protests.

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Political Parties.—The names adopted by the sections of the legislative assembly 1781 (see ASSEMBLY, NATIONAL), from the part of the house in which they sat, have, with modifications, been retained in F., and extended to parliamentary parties in Germany and other countries. Those sitting on the 'Extreme Right' and the 'Right' of the president's chair were representatives of the burgher interest. Constitutionalists like the Feuillans (q.v.), and supported the king as far as they could. The 'Left' was composed of the Girondists (q.v.), moderate republicans who favored the constitution as it stood. The 'Extreme Left' sat on the higher benches, and was nicknamed the 'Mountain,' it comprised representatives of the advanced clubs, Robespierre of the Jacobins (q.v.), and Danton of the Cordeliers (q.v.). The 'Centre' was devoid of definite principle, usually voting with the Left. Under Louis Philippe, there were four parties—the Right or strong Conservatives under Berryer (q.v.); the Right Centre under Guizot (q.v.); the Left Centre under Thiers (q.v.); and the Extreme Left under Odillon Barrot (q.v.). Under the Third Republic, the Anti-Republicans are Extreme Right, Right, and at times Right Centre, and comprise the High Conservative Legitimists, or followers of the older branch of the Bourbon (q.v.) House, with the Ultramontanes; the Orleanists or supporters of the House of Orleans (q.v.), now practically united with the Legitimists since the death of the Comte de Chambord; with them also the Bonapartists usually vote. The Left Centre and Left are Republicans more or less friendly to the govt., with Opportunists, etc.; and those of very extreme opinions, inclined to sympathy with Communists and Anarchist-Socialists, are the Extreme Left.

Public Instruction.—Public instruction is presided over by a special ministry. Nearly half the expenses connected with it are defrayed by the state, the remainder by the departments. At the head of the national system (see EDUCATION, NATIONAL) is the UNIVERSITY OF FRANCE (q.v.), which comprises the *académies* or *facultés d'état* in the 15 following towns: Aix, Besançon, Bordeaux, Caen, Clermont, Dijon, Douai, Grenoble, Lyon, Montpellier, Nancy, Paris, Poitiers, Rennes, Toulouse. Each of these academies is a more or less complete univ. and each has two or more of the five faculties of theology, law, medicine, sciences, and literature. At these academies abt. 45,000 students are educated. For secondary instruction there were in F. (1901) 110 *lycées* with 56,830 pupils; 750 private schools with 99,260 pupils; and 70 *lycées* and colleges for girls with 14,202 pupils; total 113,462 pupils. There were (1900) 5,530,232 children enrolled in primary and infant schools. In 1872, 7,702,000 persons above 20 years of age could neither read nor write; in a percentage varying from 6 per cent. of the total population in some departments in the north and east to 61 per cent. in Haute-Vienne. Of conscripts examined (1893) 6.4 per cent. could neither read nor write. More than 100 normal schools train teachers. Two great educational institutes, the Sorbonne (q.v.) and the Collège de France (q.v.),

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have separate articles. F. maintains many colleges and schools for special branches of knowledge: thus there are faculties of medicine, and superior schools of pharmacy; L'École des Chartes; des Langues Orientales; des Beaux-Arts; de Dessin; des Ponts et Chaussées; des Mines (1783); the Conservatoire (q.v.) de Musique; schools of technical education, such as the Conservatoire National des Arts et Métiers, etc. There are numerous agricultural, forest, farming, and veterinary schools, the École Polytechnique (q.v.) and other military and naval colleges. The state appropriation to the ministry of public instruction (1903) was \$43,220,418.

Literary and Scientific Institutions.—Foremost is the Institute of France (q.v.). The Museum of Natural History is one of the finest in the world. The Bureau des Longitudes and the Observatoire, at Paris and Marseille, are famous. These and other establishments all are maintained at the cost of the state; as are also the great libraries, notably the Bibliothèque Nationale: see LIBRARIES. There are public libraries in the provinces also. F. is rich in public galleries of painting, statuary, and articles of *vertu*, that of the Louvre being the most noted: see Paris.

Theatres.—The theatre, like all other public institutions, is under the surveillance of the state, which contributes to the maintenance of the drama. See COMÉDIE FRANÇAISE.

Charitable Institutions.—F. is rich in institutions of charity, many of which are remnants of the old system of church relief; but the *crèches*, which are, in fact, free nurseries, are a modern form of charity, which originated (1844) with M. Marbeau at Paris: see FOUNDLING HOSPITAL. The public hospitals and infirmaries are maintained by special endowments, a percentage on the receipts at theatres and other places of amusement, and by subsidies from the govt. and local communes. Public charities for the relief of paupers derive their resources either from departmental or municipal funds, and are administered by the *bureaux de bienfaisance*, by the *dépôts de mendicité*, and by numerous other local institutions; besides which, the state contributes between 8 and 9 million francs (1876 the sum was 8,485,810 francs) for charitable purposes.

Taxation, Finances.—The public revenues are obtained from direct and indirect taxation, and comprised in the budget, voted by the National Assembly, under the heads of ordinary resources and special resources; the former including direct and indirect taxes from stamps, the produce of forests, telegraphs, Algeria, etc.; and the latter, departmental funds, special imposts, etc. The following table shows the financial report of the public receipts and expenditure for different years 1815-1903:

Years.	Receipts, in francs.	Expenditure, in francs.
1815..	743,830,200	798,590,859
1830.....	1,631,796,054	1,095,142,115
1840.....	1,234,483,099	1,363,711,102
1850.....	1,431,622,471	1,472,537,238
1859.....	1,766,480,877	1,773,919,114
1871.....	2,190,120,590	2,161,262,952
1881.....	2,762,480,817	2,736,208,789
1903.....	3,547,876,812	3,574,398,930

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Public Debt.—In 1814, the date of the Restoration, the interest of the debt was 63 million francs; under the Bourbons it rose to 200 millions; and 1830–48, Louis Philippe increased it to 244 millions. During the three years of the second republic, 5 millions were paid off; but the second empire (1852–69) added nearly 120 millions to the annual burden. The increase of the debt during the empire arose from a succession of loans raised by borrowing directly from the mass of small capitalists, without the intervention of large banking-houses. The amount of the national debt of France is very variously given according to what is included under that head. The usual estimate of nat. debt (1902) was 30,343,590,116 francs (about \$6,068,-300,000). Leroy Beaulieu's calculation is 31,718,000,000 francs, and Camille Pelletan's 30,300,813,594 francs nominal capital, and 22,824,043,690 francs actual. The loans and other obligations incurred to meet the expenses of the war of 1870–71, including the indemnity of 5 milliards of francs to Germany, nearly doubled this sum. The total expenditure arising from the war and the foreign occupations has been finally stated at 9,820 million francs; yet in spite of this enormous strain on the exchequer, the national wealth of France has increased since the war. In 1876 provision had to be made for paying, as annual interest of the total debt, over 1,150 million francs. This was calculated to correspond to a capital sum of 23.403 millions (nearly 23½ milliards) of francs (= abt. 4,524 million dollars), which may be taken as approximately the total amount of the debt.

The continual deficits from the close of the first empire 1815 to the close of the second empire 1870, have been covered by loans, bearing interest or *rentes* at the rate of 3, 4, 4½, and 5 per cent. The budgets voted annually by the representatives of the nation have almost invariably shown a small assumed surplus; while the *compte définitif* for the corresponding period, when published some years afterward, has without exception exhibited a large deficit. The actual state of accounts with regard to national income and expenditure is not published till after the lapse of six or seven years; so that in 1877 the most recent final account (*budget réglé*) was that for 1869. To the budget of 1903 was annexed a statement showing the deficits of the ordinary budgets from the period prior to 1814 down to the end of 1889, viz.:

Period.	Government.	Deficit (francs).
Before 1815	Napoleon I. and previously..	99,678,480
1815–29	Louis XVIII. and Charles X.	269,891,915
1830–47	Louis Philippe.....	519,067,077
1848–51	Second Republic	29,399,140
1852–69	Napoleon III.....	93,921,998
	Total	1,011,868,611
1870–1901	Third Republic, surplus.....	22,874,106
	Total deficits.....	988,994,505

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Money.—It is estimated that abt. 14,700,000,000 francs in coin, of which one-third is silver, is in actual circulation in F.: of the gold coin abt. 11 per cent. and of the silver abt. 31 per cent. are of foreign origin. The French money coined 1902 amounted to 61,563,226 francs, of which abt. 800,000 francs was bronze. The Bank of F. has a monopoly of emitting bank notes, and 1902, Dec., had in circulation notes to the nominal value of 4,263,000,000 francs; the bank's capital is 225,015,000 francs. Depositors in savings banks, 1900, numbered 7,116,402, and their deposits were 3,263,994,342 francs; average of deposits 459 francs (about \$92). Depositors in postal savings banks 3,805,881, deposits 1,080,389,845 francs.

Army.—Standing armies date in F. from the time of Charles VII. The law of 1832 regulated the system of recruiting by conscription, on the footing which, with few modifications, it has subsequently occupied. By the law of 1872, substitution and enlistment for money are prohibited, and the principle of universal liability to arms is laid down, in accordance with which every Frenchman must be for five years in the 'active army,' four years in the reserve of the same, five years in the territorial army, and six years in the reserve of the territorial army. All privileges of exemption were abolished 1887, including those of pupils in clerical seminaries. All soldiers in the active army who have learnt their duties, and who can read and write, may be sent on furlough at the end of a year, for an indefinite time. According to the law of 1887, July 25, F. had 1890 an active army comprising 28,446 officers; 1,228,901 non-commissioned officers and men; 26,000 non-combatants; 243,463 horses; 2,160 guns; and 40,907 vehicles. The field reserve had 9,483 officers, 822,558 non-commissioned officers and men; 492,314 non-combatants; 65,920 horses; 1,728 guns; and 4,680 vehicles. The first reserve had 14,605 officers; 937,993 non-commissioned officers and men; 80,404 horses; and 3,602 guns. The second reserve had 13,800 officers; 1,119,204 non-commissioned officers and men; 32,603 horses; and 864 guns. Total active: 66,333 officers; 4,103,655 non-commissioned officers and men, 423,393 horses; and 10,354 guns, including those in frontier fortresses. The peace establishment comprised 358,509 inf.; 69,412 cav.; 77,840 artil.; 28,072 engineers and train; 119,300 horses; and 9,764 guns, including those mounted in the frontier fortresses. The fortified *chefs lieux* are at Arras, Bayonne, Béziers, Bourges, Brest, Cherbourg, Grenoble, Langres, La Rochelle, La Havre, Lille, Lyon, Marseille, Montpellier, Nantes, Perpignan, St. Omer, Toulon, and Toulouse. Since the annexation of Metz and Strasburg by Germany, Avignon, Perpignan, Quiberon, and Rouen have taken their place. In 1903 the peace strength including Algeria and Tunis was 557,580 men and 29,706 officers; total 587,286. The total number of horses was 142,823. The war strength was estimated at about 2,500,000 officers and men.

Navy.—In 1902, the French navy numbered 15 vice-admirals (4 in reserve), 30 rear-admirals, 125 captains of first-class men-of-war, 235 capt. of frigate, 774 lieuts.,

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and 502 ensigns. The sailors afloat and on shore numbered 50,496, which, together with engineers, etc., brought the grand total of those employed in the fleet to about 57,970. The inscription for the navy owes its systematic organization to the great minister Colbert (1681). At present all persons engaged in any maritime avocation between the ages of 18 and 50 are liable to inscription, but the service is compulsory for only 5 years. The navy comprised (1901) 26 battle-ships, 18 port defense ships, 68 cruisers, 187 torpedo craft. The French navy stands next in importance to that of G. B. The naval establishment included (1901) 1,733 executive officers, 225 principal engineer officers; 40,589 rank and file, including seamen, artificers, stokers, etc.

For the money, weights, and measures used in F., see FRANC: METRE: LITRE: GRAMME. For further information on France, geographical and statistical, see Reclus's *Nouvelle Geographie*; Block's *Annuaire*, and his *Dictionnaire*; official publications, such as the *Annuaire Statistique de la France*; the *Almanach de Gotha*, *Statesman's Yearbook*, etc. For the history of France, see the great works of Martin, Michelet, Anquetil, Sismondi, Guizot, Duruy; and for special periods, Thiers, Lamartine, Louis Blanc, etc.; in English, Kitchin's history of France, and Crowe's; also Carlyle's *French Revolution*. See also many special titles in this work: as STATES-GENERAL: ASSEMBLY, NATIONAL: NATIONAL CONVENTION: DIRECTORY: GIRONDISTS: JACOBINS: GALLICIAN CHURCH: ETC.: also the kings of France: also ROBESPIERRE: NAPOLEON: ETC.

History.—France nearly corresponds with what the Romans knew as Gallia, or more precisely Gallia Transalpina, to distinguish Gaul proper from the Italian province on the Roman side of the Alps, occupied, after B. C. 3d c., by Gauls, and known as *Gallia Cisalpina*: see CELTIC NATIONS: ROME. Gallia Transalpina had, however, wider boundaries than modern France, and comprised the whole area between the Rhine, the Alps, the Mediterranean, the Pyrenees and the Atlantic. At the dawn of history, this area was occupied mainly by three races. In the s.w. were the Iberians or Aquitanians, a race whose ethnological position has never been certainly fixed, was easily and strongly distinguished from the others, and has usually been identified with the Basques still found n. and s. of the Pyrenees (see BASQUE PROVINCES: AQUITANIA). The Gauls in the centre. n., and w., were typical Celts (see CELTIC NATIONS); the Belgæ (q.v.), in the n. and n.e., were closely allied to the Gauls, and probably intermediate between them and the Germans. There were also some tribes of Germans, Ligurians, and Greeks, but the latter never penetrated far beyond the shores of the Mediterranean, where they planted colonies, the most important of which was Massalia (Marseilles). Under Augustus, Gaul was divided into four provinces, which, under subsequent emperors, were dismembered, and subdivided into seventeen. In the decline of the Roman power, Gaul was ravaged by neighboring hordes, and in the 5th c. it fell completely under the power of the Visigoths, Burgundians.

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and Franks. In A.D. 486, Clovis, a chief of the Sallian Franks, raised himself to supreme power in the north. His dynasty, known as the Merovingian, ended in the person of Childeric III, who was deposed, 752, after the kingly power had already passed into the hands of the former Maire du Palais, Pepin d'Heristal, and, after him, into those of Charles Martel and Pepin le Bref. The accession of Pepin gave new vigor to the monarchy, which, under his son and successor Charlemagne, crowned emperor of the West in 800 (768-814), rose to the rank of the most powerful empire of the West. Christianity, civilization, and letters were protected during his reign, and before his death he had stretched the limits of his empire from the Eider and the German Ocean to the Ebro and the Mediterranean, and from the Atlantic to the Baltic. With his death, however, this vast fabric of power crumbled in pieces, and his weak descendants completed the ruin of the Frankish empire by the dismemberment of its various parts among the younger branches of the Carlovingian family. Intestine wars desolated the land, and foreign assailants threatened it on every side. In 911, the ravages of the Northmen had assumed so persistent a character, that Charles le Simple was glad to purchase immunity from their encroachments by the cession of the territory subsequently known as Normandy. Anarchy reigned paramount; the various governors established a hereditary authority in their several governments, and the crown was by degrees deprived of the noblest part of its appanages. The power of some of the vassals surpassed that of the kings; and on the death of Louis V. the Carlovingian dynasty was replaced by that of Hugues, Count of Paris, whose son, Hugues Capet, was elected king by the army, and consecrated at Rheims, 987. At this period, the greater part of F. was held by almost independent lords, and the authority of the Capetian kings extended little beyond Paris and Orleans. Louis le Gros (1108-37) was the first of the race who reinstated order. He promoted the establishment of the feudal system, abolished serfdom on his own estates, secured corporate rights to the cities under his jurisdiction, and gave efficiency to the central authority of the crown. A greater degree of general order was thus secured, while a new element in the state was generated by the foundation of a free burgher class. Louis carried on a war against Henry I of England; and when the latter allied himself with the Emperor Henry V. of Germany against F., Louis brought into the field an army of 200,000 men, whose ready appearance afforded the first instance of the existence of a common national feeling of patriotism, ready to respond to the appeal of the sovereign. The *oriflamme* is said to have been borne aloft for the first time on this occasion as the national standard. Louis VII. (*Le Jeune*), who took part in the second crusade (1137-80), was almost incessantly engaged in war with Henry II. of England. His son and successor, Philippe Auguste (1180-1223) recovered Normandy, Maine; Touraine, and Poitou from John of England, and increased the power of the crown in various other parts of France. He took an active

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personal share in the Crusades, and permitted the pope to organize a cruel persecution against the Albigenses in the southern parts of the country. Philippe was the first to levy a tax for the maintenance of a standing army, and in his reign a chamber of peers, of six secular and six ecclesiastical members, was instituted, to act as a council of state. Many noble institutions date their origin from this reign, as the University of Paris, the Louvre, etc. By the amendment of the administration of justice, the right of appeal to the royal courts was established, and the arbitrary power of the great vassals crippled. Improvements in the mode of administering the law were continued under his son, Louis VIII. (1223-26), and his grandson, Louis IX. (1226-70), who caused a code of laws (*Etablissements de St. Louis*) to be promulgated. St. Louis also effected many modifications in the fiscal department, and, before his departure for the Crusades, secured the rights of the Gallican Church by a special statute, in order to counteract the constantly increasing assumptions of the papal power. Under his son, Philippe III. (1270-85), titles of nobility were first conferred by letters-patent. He added Valois and the *comtés* of Toulouse and Venaissin to the crown. Philippe IV. (1285-1314), surnamed *Le Bel*, acquired Navarre, Champagne, and Brie by marriage. With a view of securing support against the secular and ecclesiastical nobility, with whom he was constantly at war, Philippe gave prominence to the burgher element in the nation, and 1302, Mar. 28, he, for the first time called together the *états généraux*, or general estates, at which the *tiers état*, or burgher class, appeared together with the nobles and clergy. These changes were, however, accompanied by arbitrary innovations in the fiscal and other departments of the government, which were effected with reckless haste and violence. With a view of securing to the crown the great fiefs, he abrogated the right of females to succeed to landed property. His tyrannical persecution of the Templars showed the extent to which the regal power could be stretched; and under his successors, Louis X. (1314-16), Philippe V. (1316-21), and Charles IV. (*Le Bel*), (1321-28) the last direct descendant of the Capetian line, the rule of the kings of F. became even more unlimited, while the court was given up to every species of luxurious indulgence known to the age. Philippe VI., the first of the House of Valois (1328-50), distant relative of Charles IV., and nephew of Philippe IV., succeeded in right of the salic law. His reign, and those of his successors, Jean (1350-64) and Charles V. (*Le Sage*), 1364-80), were disturbed by constant wars with Edward III. of England, who laid claim to the throne in right of his mother, daughter of Philippe le Bel. The war began 1339; in 1346, the battle of Crécy was fought; at the battle of Poitiers (1356), Jean was made captive; and before its close after the death of Edward (1377), the state was reduced to bankruptcy, the nobility excited to rebellion, and the mass of the people sunk in barbarism. Falsification of the coinage, onerous taxation, and arbitrary conscrip-

tions, brought the country to the verge of irretrievable ruin, while the victories of England humbled the sovereign, annihilated the French armies, and cut down the flower of the nation. The long and weak minority of Richard II. diverted the English from the prosecution of their groundless claims to the kingdom of F., which revived somewhat from the effect of its long and disastrous warfare; but during the regency for the minor, Charles VI. (*Le Bien Aimé*), (1380-1422), the war was renewed with increased vigor on the part of the English nation, stimulated by the daring valor of Henry V. The signal victory won by the English at Azincourt 1415; the treason and rebellion of the French princes of the blood, who governed the larger provinces; the ambition of the several regents, the ultimate imbecility of the king, the profligacy of his queen, and the love of pleasure early evinced by the dauphin; all combined to aid Henry in his attempts upon the throne. But the premature death of Henry, the persevering spirit of the people, and the extraordinary influence exercised over her countrymen by the Maid of Orleans, concurred in bringing about a thorough reaction, and, after a period of murder, rapine, and anarchy, Charles VII. (*Le Victorieux*), (1422-61), was crowned at Rheims. He obtained from the Estates-General a regular tax (*taille*) for the maintenance of paid soldiers, to keep in check the mercenaries and marauders who pillaged the country. The policy of his successor, Louis XI. (1461-83), the first king entitled 'His most Christian Majesty,' favored the burgher and trading classes at the expense of the nobles, while he humbled the power of the crown princes. He was a crafty ruler, who managed the finances well, and succeeded, by policy and good-luck, in recovering for the crown the territories of Maine, Anjou, and Provence; while he made himself master of some portions of the territories of Charles the Bold, Duke of Burgundy. Charles VIII. (1483-98), by his marriage with Anne of Brittany, secured that powerful state, and consolidated the increasing power of the crown. With him ended the direct male succession of the House of Valois. Louis XII. (1498-1515), (*Le Père du Peuple*) was the only representative of the *Valois-Orleans* family. The tendency of his reign was to confirm the regal supremacy, while the general condition of the people was ameliorated. He and his successor, Francis I. (1515-47), of the *Valois-Angoulême* branch, wasted their resources in futile attempts to establish their hereditary claims to Lombardy, and were thus perpetually embroiled with the House of Austria. A *concordat* with the pope, signed 1516, secured the nomination of the Gallican bishops to the king. In this reign, the Assembly of Notables and Deputies superseded the General-Estates. The defeat of Francis at the battle at Pavia, 1525, and his subsequent imprisonment at Madrid, threw the affairs of the nation into the greatest disorder, and embarrassed the public finances to a ruinous extent. Arts and literature were encouraged in this reign, and in that of the succeeding monarch, Henry II. (1547-59), who continued the disastrous Italian war. In the latter reign be-

gan the persecutions of the Protestants, which were carried on with still greater cruelty under Henri's three sons, Francis II. (1559-60), Charles IX. (1560-74), and Henry III. (1574-89), last of this branch of the *Valois*. The massacre of St. Bartholomew (1572) was perpetrated under the direction of the queen-mother, Catharine de' Medici, and the confederation of the League, at the head of which were the Guises. The wars of the League, which were carried on by the latter against the Bourbon branches of the princes of the blood-royal, involved the whole nation in their vortex. The succession of Henry IV. of Navarre (1589-1610), a Bourbon prince, descended from a younger son of St. Louis, allayed the fury of these religious wars, but his recantation of Protestantism in favor of Rom. Catholicism, disappointed his own party. The early part of his reign was perpetually disturbed by the mutinies of the troops and the rebellions of the nobles. By degrees, however, Henri through the astute counsels of his minister Sully, and by his own personal popularity, raised the power of the crown higher than ever, while he began a system of thorough administrative reform, which was arrested by his assassination by the fanatic Ravallac. During the minority of his son, Louis XIII. (1610-43), Cardinal Richelieu, under the nominal regency of Marie de' Medici, the queen-mother, ruled F. with a firm hand, though his oppression of the Protestants at home, and his co-operation with them abroad, in endeavoring to humble the House of Austria, entailed long and costly wars with little fame on France. Cardinal Mazarin, under the regency of the queen-mother, Anne of Austria, exerted nearly equal power for some time during the minority of Louis XIV. (1643-1715). The wars of the Fronde, the misconduct of the parliament, and the humbling of the nobility, gave rise to another civil war, but with the assumption of power by young Louis, a new era commenced, and till near the close of his long reign, the military successes of the French were most brilliant, and the boundaries of F. were enlarged very nearly to what they were before the war of 1870-1. The military glory of the kingdom was maintained by a host of gallant commanders, among whom stood conspicuous the names of Turenne, Vauban, Luxembourg, Catinat, Vendôme, Boufflers, and Créqui, while, by the far-sighted policy of the minister Louvois, a well-organized army and newly-created navy made the power of F. formidable to all neighboring nations. The progress of the people in the arts of peace was not less marked. At the close of his rule, the oppressive war taxes, the prodigality of the court, the luxurious lives of the clergy, and the absolutism and bigotry of the aged monarch, combined to undermine the foundations of national prosperity and freedom, and at his death the state was left trammelled with a debt of 3,500 millions of livres, and his youthful heir, Louis XV. (1715-75), succeeded to a heritage whose glory was tarnished, and whose stability was shaken to its foundations. The long inglorious reign of Louis XV. presents nothing worthy of notice except the gradual rise of those

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sentiments of infidelity and license which prepared the overthrow of all the ancient institutions of the country. The regency of the profligate Orleans paved the way for the miseries which followed, while his corrupt financial administration brought the nation into overwhelming monetary embarrassments. In this reign, Corsica was added to France. The thorough disorganization of the state, and the neglect of the fleet and army, prevented all attempts at conquests either on sea or land. The colonies were left a prey to the attacks of other powers, while the capricious change of policy which the king's mistress, Madame Pompadour, forced upon the government, brought contempt upon the country. The peace of Paris, 1763, by which the greater portion of the colonial possessions of F. were given up to England, terminated an inglorious war, in which the French had expended 1,350 millions of francs. The close of this unhappy reign was still further disturbed by the cabals of the Jesuits, who were finally banished 1764. In 1774, Louis XVI., a well-meaning, weak prince, succeeded to the throne. His first ministers, Maurepas, Turgot, and Malesherbes, had not the vigor to carry out the reforms which their sense and patriotism suggested to them, and they were soon compelled to yield to the intrigues of the nobility, and resign their places. They were succeeded by the financier Necker, who endeavored, by economy and method, to arrest the impending bankruptcy of the state; and succeeding ministers made futile attempts to diminish these financial disorders by new forms of taxation, which were generally opposed either by the assembly or by the court. The American war of independence had disseminated republican ideas among the lower orders, while the Assembly of the Notables had discussed and made known to all classes the incapacity of the government, and the wanton prodigality of the court. The nobles and the *tiers état* were alike clamorous for a meeting of the States; the former wishing to impose new taxes on the nation, and the latter determined to inaugurate a thorough and systematic reform. After much opposition on the part of the king and court, the *États Généraux*, which had not met since 1614, assembled at Versailles 1789, May 25.

F. was at that moment ripe for a revolution. Although the nobility was exceedingly numerous (as not only did the children of a noble belong to this class, but its numbers were constantly being increased by creation), there were great differences in the rank and dignity attached to the order; thus, in 1789, there were only 44 secular peers, independently of the princes of the blood, and the six originally created ecclesiastic peers; but the lower grades of nobility were so numerous that their numbers stood in the ratio of 1 to 250 of the entire population. Nevertheless, every grade of nobility exempted its holder from the payment of the ordinary land tax, or *taille*, from the charge of maintaining the public roads (*corvée*), from military conscription, from receiving billets of soldiers, etc. The nobles paid the *capitation* tax, but in a very un-

equal proportion, though the landed property was vested almost entirely in their hands. They, in fact (together with the clergy), monopolized the principal share of the national revenues, and left to the lower classes the burden of labor and of paying the taxes. At the outbreak of the Revolution, the French nobility was sunk in profligacy, and fallen to the lowest stage of demoralization. The clergy kept pace with the nobles in general depravity, and while their aggregate revenues amounted, according to Necker, to 130,000,000 of livres, and their landed property stood in the relation of 1 to $5\frac{3}{4}$ of that of all other proprietors, their contribution toward the maintenance of the state were inadequate and irregular. The open profligacy and excesses of many of the higher members of the hierarchy, moreover, brought the whole priestly order into disrepute. Francis I. had wrung from the church a tithe, known as the *décime paschale*, and every five years the clergy were expected to present their so-called *dons gratuits oratoires*, of from 15 to 18 million of livres; while on occasions of need they from time to time made extraordinary *dons gratuits*, which, however, were usually repaid at long intervals. The *tiers état* were crushed by the weight of an unjust taxation, rendered more obnoxious by the system of farming out some of the taxes. The most tyrannical of these was the tax on salt. The municipal institutions which had been permitted to flourish under some of the Valois princes in the middle ages, were almost entirely abolished, and the offices of towns, like those of the state and the courts of justice, were either hereditary or open to purchase. The *tiers état*, which included professional men, and all who were not either members of the noble or the clerical orders, saw themselves utterly excluded from all participation in the privileges and duties of free citizens, at the very time when the extensive circulation of the writings of the philosophers of the 18th c., as Voltaire, Malesherbes, Rousseau, and Montesquieu, had habituated men's minds to the discussion of questions of political independence, equal rights, and universal freedom.

The resistance made by Louis and his advisers to the reasonable demands of the Deputies, 1789, June 17, led to the constitution of the National Assembly—which was followed, June 23, by a declaration of the inviolability of its members. The king retaliated by ordering a large body of troops under arms, dissolved his ministry, and banished Necker, whom he had shortly before recalled under the pressure of public opinion. The consequence was the outbreak of insurrectionary movements at Paris, where blood was shed July 13. On the following day, the national guard was convoked; and on the 14th, the people took possession of the Bastille. The provinces repeated the acts of Paris, and everywhere national guards and revolutionary municipal councils were called together. On Aug. 4, feudal and manorial rights were abrogated by the National Assembly, which gave expression to a solemn declaration of the equality of human rights. The royal princes and all the nobles who could escape sought safety

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in flight. The royal family having attempted in vain to follow their example, tried to conciliate the people by the feigned assumption of republican sentiments; but on Oct. 5, the rabble, followed by numbers of the national guard, attacked Versailles, and compelled the king and his family to remove to Paris, whither the Assembly also moved. The next two years witnessed the solemn inauguration and the subsequent retraction of various constitutional schemes; the princes of the blood and the ancient noblesse raised corps of emigrés in different parts of the country, but their efforts could not arrest the spread of republicanism. The king alternately made concessions to the republicans, and cherished schemes for escaping from their surveillance, but each month added to his humiliations and to the audacity of those surrounding him. A war with Austria was begun 1792, Apr.; and the defeat of the French was visited on Louis, who was confined in Aug. with his family in the Temple. The advance of the Prussians into Champagne threw Paris into the wildest excitement. The National Assembly dissolved itself in September. In Dec., the king was brought to trial, and called upon to answer for repeated acts of treason against the republic. On 1793, Jan. 20, sentence of death was passed upon him; and on the following day he was beheaded. Revolts burst out in every part of France. England, Holland, Spain, Naples, and the German states combined together against the republic. Christianity was now formally deposed, and the sacredness of the republic and the worship of Reason were solemnized. Marie Antoinette, the widowed queen, was guillotined; the dauphin and his surviving relatives suffered every indignity that malignity could devise. A reign of blood and terror succeeded. Danton and Robespierre, after having condemned countless numbers to the guillotine, suffered each in turn a similar fate. After the destruction of the Terrorists, a reaction was gradually established; the people were wearied of bloodshed, and anxious for peace and order at any cost. The brilliant exploits of the young general, Napoleon Bonaparte, in Italy, turned men's thoughts to other channels. In 1795, a general amnesty was declared, peace was concluded with Prussia and Spain, and the war was carried on with redoubled vigor against Austria. The Revolution had reached a turning-point. A Directory was formed to administer the government, which was now conducted in a spirit of order and conciliation. In 1797, Bonaparte and his brother-commanders were omnipotent in Italy. Austria was compelled to give up Belgium, accede to peace on any terms, and recognize the Cisalpine Republic. The glory of the French arms was re-established abroad, but at home the nation were still suffering from the shock of the Revolution. The Directory repudiated two-thirds of the national debt, and thus almost ruined the commerce and credit of France. Under the pretext of attacking England, a fleet of 400 ships and an army of 36,000 picked men were equipped; their destination proved, however, to be Egypt, whither the Direct-

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ory sent Bonaparte; but the young general, resigning the command to Kleber, landed in F. 1799, and at once succeeded in supplanting the Directory, and securing his own nomination as Consul, conjointly with Sièyes and Roger Ducos. In 1800, a new constitution was promulgated, which, though in appearance purely constitutional, in reality vested the sole executive power in Bonaparte, who showed consummate skill in re-organizing the government, to which he imparted a systematic efficiency and a spirit of centralization, that secured a thoroughly practical administration. Having resumed his military duties, he marched an army over the Alps, attacked the Austrians unawares, and decided the fate of Italy by his victory at Marengo. In 1801, the peace of Lunéville was concluded, and the boundaries of F. were extended to the Rhine. England was the only country which refused to recognize the legality of the various Italian and German conquests of F.; and with the exception of a brief period of peace, it remained the implacable foe of Bonaparte from the days of the Consulate to his defeat at Waterloo. Every period of respite from war was employed by the First Consul in reinstating trade and industry, and in obliterating both in private and public life the stains left by the Reign of Terror. In 1804, on an appeal by universal suffrage to the nation, Bonaparte was proclaimed emperor. The pope came to Paris to crown him and his wife Josephine; a new nobility was rapidly created, and the relatives and favorites of the emperor received vanquished kingdoms and principalities at his hands. For a time, Napoleon's influence with the weakened powers of the continent succeeded in maintaining an injurious system of blockade against England; and, except in the Peninsula, his arms were everywhere victorious. By his marriage with the Archduchess Marie Louisa, daughter of the Emperor of Germany, Napoleon seemed to have given to his throne the prestige of birth, which alone it had lacked. He now availed himself of the freedom afforded by the peace with Austria to expand the material prosperity of the country, by encouraging trade, constructing roads, bridges, and canals in every part of the empire, and by consolidating his government, and organizing a complete code of laws and a systematic mode of administering them. But this period was the poorest in respect to the literary and scientific development of the nation, who were too much trammelled by police supervision and military discipline to exercise freedom of thought and intellect, and this interval of comparative repose was soon interrupted by the ambitious designs of Napoleon on Germany, which led to a declaration of war against Russia 1812. From this time to his final defeat 1815, the emperor rapidly receded from the lofty station that he had won. The disastrous Russian campaign, in which his noble army was lost amid the rigors of a northern winter, was soon followed by the falling away of his allies and feudatories. Napoleon himself was still victorious wherever he appeared in person, but his generals were beaten in numerous engagements; and the great de-

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feat of Lelpsic compelled the French to retreat beyond the Rhine. The Swedes brought reinforcements to swell the ranks of his enemies on the e. frontier, while the English pressed on from the w ; the senate and his ministry betrayed his cause, and the allies threw themselves on Paris, which, in the absence of the emperor, capitulated after a short resistance, 1814, Mar. 30. Napoleon now abdicated in favor of his young son, and retired to the island of Elba, the sovereignty of which had been granted to him. His wife and son removed to Vienna; his family were declared to have forfeited the throne; F. was reduced to her former limits, and the provinces that she had acquired were restored to their national rulers. On May 3, Louis XVIII. (brother of Louis XVI.) made his entry into Paris. The conduct of the Bourbons did not conciliate the nation; they returned loaded with debts, and surrounded by the old nobility and clergy, who had not renounced their former privileges, and who had looked upon the generation of Frenchmen who had arisen during their absence as their natural enemies. A narrow spirit influenced the weak policy of the king, which led to the establishment of a strict censorship, the extension of the powers of the police, and the persecution of all the adherents of the Empire; while the lower classes and the army, who alike were sensible of the humiliating reaction which had followed the former excitement of war and conquest, were treated with an indifference, and even contempt, by the returned emigrés to which they were wholly unaccustomed. 1815, Mar. 1, Napoleon left Elba, and landed in France. Crowds followed him; the soldiers flocked around his standard; the Bourbons fled, and he took possession of their lately deserted palaces. The news of his landing spread terror through Europe; and on Mar. 25, a treaty of alliance was signed at Vienna between Austria, Russia, Prussia, and England, and preparations at once made to put down the movement in his favor, and restore the Bourbon dynasty. At first, the old *prestige* of success seemed to attend Napoleon; but on June 18, he was thoroughly defeated at Waterloo; and having placed himself under the safeguard of the English, he was sent to the island of St. Helena, in conformity with the generally acknowledged sentiment, that it was necessary to the peace of Europe to remove him finally and definitely from the scene of his former power. The second restoration gave occasion to many pledges of a more liberal policy on the part of Louis, but few of them were fulfilled, and a general and sullen discontent reigned among the people, who were again deprived of all voice in the administration, or in the election to offices, and were harassed by the petty tyranny of the priests, who were the favorite advisers of the crown. In 1821, Napoleon breathed his last at St. Helena; and in 1824, Louis XVIII. died without direct heirs, and his brother, the Duc D'Artois, succeeded as Charles X. The same ministerial incapacity, want of good faith, general discontent, and excessive priestly influence characterized this reign, which was abruptly brought to a close by the revolution of 1830, and the election to the

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throne of Louis Philippe, Duke of Orleans, as king, by the will of the people. Legitimist insurrections disturbed the nation; one *émeute* succeeded another; attempts upon the king's life were frequent; but the progress in material prosperity made the government popular with the *bourgeoisie*, or middle classes, and for a time it held its ground. The war-like propensities of the nation found an outlet in the war in Algeria (q.v.) with Abd-el-Kader. But the determined resistance of the king to the growing desire for electoral reform, led at last to open insurrection in Paris; and Louis Philippe having abdicated, 1848, Feb. 24, a Republic was proclaimed; under a provisional government. An insurrection of the Red Republicans in Paris (1848, June) was put down only after great slaughter. Louis Napoleon (q.v.) was elected President of the Republic 1848, Dec.; but by the famous *coup d'état* of 1851, Dec. 2, he violently set aside the constitution, and assumed dictatorial powers; and a year after (1852, Dec. 2) was raised, by the almost unanimous voice of the nation, to the dignity of Emperor as Napoleon III. His rule was one of complete absolutism, under which, however, France made great advances in the development of her natural resources, and in manufactures. Assuming the character of an adjuster of the wrongs of nations, Napoleon proclaimed himself a mediator in the Danish and Austro-Prussian wars, and the defender of the Italians against Austria, of the Pope against the people of Italy, and of the Mexicans against the government of the United States of America. By his help the Italians were relieved from the Austrian yoke, and the pope was left master of Rome; but in Mexico his intervention only led to greater bloodshed, and ended ignominiously for the glory of F., and fatally for the cause and life of his protégé, the Austrian Prince Maximilian (q.v.). Attempts to gain a Prussian alliance ended in humiliating repulses. Although the brilliant success of the Paris Exhibition of 1867 seemed to afford evidence of the personal and national consideration in which the emperor was held, his political credit had already then lost its importance. At home, the great financial embarrassments of his government were arousing the discontent of the people; and to avert the growing disaffection, Napoleon offered (1869) to adopt a constitutional form of government, and to make some concessions in regard to freedom of the press. It was soon found that the responsibility of the ministry was fictitious, and that the emperor availed himself of its protection to cloak his own acts of personal government. The result of the appeal made to the nation 1870, on the plea of securing their sanction for his policy, was not what he had anticipated; and the 50,000 dissentient votes given by the troops in this plébiscite, revealed a hitherto unsuspected source of danger. Confident in the efficiency of the army, and anxious to rekindle its ardor, he availed himself of a pretext to declare war against Prussia. The course of events in the short but terrible Franco-German conflict of 1870-1 electrified Europe by its unexpected character, revealing at once the solidity of Prussian strength, and the hollowness of imperial power

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in F. Within a fortnight of the emperor's appearance at the head of his troops at Metz, 1870, July 28, the strength of the French army was annihilated, Alsace and Lorraine were occupied by Germans, and the Chamber of Deputies in Paris was clamoring for his abdication. On Sep. 2, Napoleon, with his army of 90,000 men, surrendered at Sedan, and on the 4th, Paris was in rebellion, the senate dissolved, the Empress Regent a fugitive on her way to England, and F. proclaimed a Republic amid tumultuous excitement. Before the close of Sep., Strasburg, one of the last hopes of F., had capitulated, and Paris was completely invested by German troops; and on Oct. 5, the Prussian king had taken up his headquarters at Versailles. The fall of Metz, with 180,000 men, completed the disasters of the year. In 1871, Jan., the united efforts of the different branches of 'the Provisional Government of Defense,' respectively installed at Paris and Tours, succeeded in bringing about an armistice, after the besieged Parisians had for four months been hourly exposed to the fire of the enemy, cut off from all communication with the outer world except by balloons and carrier pigeons, and finally threatened by famine. With the concurrence of Prussia, the French nation now proceeded, by a general election of representatives, to provide for the exigencies of the country. The first National Assembly of the French Republic met at Bordeaux in February. After receiving from the Provisional Govt. of Defense the resignation of the powers confided to them in 1870, Sep., the Assembly undertook to organize the Republican Govt., and nominated M. Thiers chief of the executive power of the state, with the title of President of the French Republic, but with the condition of responsibility to the National Assembly. On Mar. 1 the preliminaries of peace were finally ratified at Bordeaux, the chief conditions being that the province of Alsace (except Belfort) and part of Lorraine, including Metz, should be ceded to the German empire, and that F. should pay a war indemnity of 5,000 millions of francs, and continue to be occupied by German troops till the money was all paid. This enormous obligation was discharged 1873, Sep., and during the same month, F., after an occupation of three years, was finally relieved from the presence of foreign troops. For further account of this war, see FRANCO-GERMAN WAR.—In the spring of 1871, the peace of F. was seriously threatened by a successful outbreak at Paris on the part of the Communists (q.v.), who after great bloodshed and grievous damage to public and private property, were quelled by the regular army, which had sided with the government, and on May 20 order was restored in Paris. Since then, F. has been successfully trying to obliterate some of the numerous misfortunes resulting from the war, and commerce and national prosperity have very rapidly revived. The ex-Emperor Napoleon died 1872, at Chislehurst, England, where he had resided with his family since his liberation 1871, March. In 1873 M. Thiers resigned the office of Pres. of the French Republic, and was succeeded by Marshal MacMahon, who soon had his presidential powers confirmed to him for a period of seven years, generally known as the Septennate.

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The ministry of the Duc de Broglie was composed mainly of Legitimists, Orleanists, and Bonapartists, and in its time ultramontaniam and Bonapartism made progress. The fusion of the Orleanists and Legitimists, though earnestly attempted, was completely foiled by the obstinacy of the Duc de Chambord. Several ministries succeeded that of De Broglie, and there were fears of a *coup d'état* on the part of the president. But the elections of 1877 returned a large republican majority to the Chamber of Deputies; and MacMahon, yielding to the national will, summoned M. Dufaure, who chose a thoroughly republican ministry. In 1879, the Senate also became predominantly republican. Reactionary prefects were removed; and, on the whole, the republican form of government was greatly consolidated during MacMahon's tenure of office, and continued to secure more and more the confidence of the French people. The national vigor and prosperity were manifested in a successful International Exhibition at Paris 1878. Early in 1879, MacMahon, disapproving of certain military changes resigned office, and M. Grévy (q.v.) became president. There have been many changes of ministry, M. Gambetta (q.v.) having formed a ministry 1881, Nov., only to resign 1882, Jan., the year of his death; but the current of policy has been steadily republican. An amnesty was granted to the Communist prisoners. At the instance of M. Ferry, who became premier 1883, a decree was issued by which Jesuit schools were closed; all unrecognized religious orders declining to submit to the conditions necessary for state sanction, were dissolved; and some 7,400 inhabitants were thus expelled from 384 monasteries. See EDUCATION: *State Education in F.* Much controversy turned on the political proposal, supported by M. Gambetta, to make the department the electoral unit of area (introducing *scrutin de liste*), instead of the arrondissement (with *scrutin d'arrondissement*) as heretofore. In 1884, the constitution was revised, and the senate was made entirely elective: the princes were declared ineligible to any office. France sent an expedition to Tunis 1881, and compelled the Bey to sign a treaty by which Tunis became virtually a French protectorate (see TUNIS). In 1883, France claimed certain rights over the n.w. part of Madagascar, and enforced the claim by bombarding and occupying several ports. And in spite of the opposition of Annam and China, she insisted on having the protectorate of Tonquin (q.v.). This led to a military expedition thither, which met with stubborn and prolonged resistance. Popular dissatisfaction with the war policy led to a change of cabinet; and 1885, Apr., Henri Brisson became premier. The succeeding elections reduced the Republican majority in the chamber; and a new cabinet was formed 1886, under de Freycinet. A decree was passed banishing or disfranchising the Orleans princes. The Freycinet ministry was defeated 1886, Dec., and followed by one organized by René Goblet, who appointed Gen. Boulanger minister of war. The latter achieved notoriety by his energy, activity, and bill for the reorganization of the army, but lost office on the fall of the Goblet ministry 1887, May.

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Maurice Rouvière formed the succeeding cabinet. Gen. Boulanger was removed from his command, and immediately began an agitation for a revision of the constitution, and while charged by opponents with an intention of making himself dictator was elected to the assembly from several depts. in succession. In 1888, July, he was wounded in a duel with Charles Thomas Floquet, premier (1888, Apr. 1), and numerous riotous demonstrations were precipitated by his adherents. 1887, Dec. 13, the Rouvière cabinet resigned, and was followed by that of Paul Emmanuel Tirard. The exposure of the sale of decorations and of the questionable practices of Wilson, Pres. Grévy's son-in-law, created wide-spread excitement 1887, and led to Grévy's resignation, Dec. 2, and the election of Marie François Sadi Carnot (q.v.) as his successor. A projected world's fair at Paris in 1889, receiving no countenance from Russia, Austria, and Germany, on political grounds, was taken in hand by the govt. and proved a grand success. Ex-pres. Grévy died 1891, Sep. 9; Gen. Boulanger killed himself in Brussels Sep. 30. The prohibition against American pork was removed 1891, Dec. 4; and a commercial reciprocity treaty with the United States was signed 1892, March. In 1893, on charges of bribery and corruption, Ferdinand and Charles de Lesseps, M. Baihaut, ex-minister of public works, and others were condemned to fines and imprisonment. A sentence passed against the elder De Lesseps was never executed. Pres. Carnot was assassinated at Lyons 1894, June 25. M. Casimir Perier was elected pres. June 27. A war with Madagascar (1895) resulted in the establishment (Oct.) of a French protectorate which is a virtual annexation of the island. Pres. Casimir Perier resigned his office 1895, Jan. 15. M. François Félix Faure was elected pres. Jan. 17. For recent relations of F. with Russia see DUAL ALLIANCE.

FRANCE, ISLE OF: see MAURITIUS.

FRANCESCO DI PAULA, *frân-chës'ko dē pow'lá* SAINT: founder of the order of the *Minims*: 1413–1507; b. Paula or Paolo, a village of Calabria. At the age of 14 he was already famous for austerity of life. He was summoned to the deathbed of Louis XI. of France, to work a cure. Charles VIII. and Louis XI. induced him to settle in France, and built him convents.

FRANCHE COMTE, *frôngsh kông-tā'*: old province in the e. of France, in the basin of the Rhone. It comprised what now forms the dept. of Doubs, Haute-Saône, and Jura, and had for its capital Besançon.

FRANCHISE, n. *frân'chiz* or *-chiz* [F. *franchise*—from *franc*, open, free—from mid. L. *francus*, free; Icel. *frackr*, freeborn, a Frank: Bret. *frank*, spacious, wide: OE. *frank-lin*, a freeman]: privilege; right granted; in OE., extent of jurisdiction. In English Law: a royal privilege, or branch of the crown's prerogative, subsisting in the hands of the subject. Franchise properly means freedom, and by an easy transition, the privileges of the freeman; whence it came to signify the privileges just defined. Being derived from the crown, franchises must arise from royal

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grant, or in some cases may be held by prescription, which presupposes a grant. The subjects of franchise being the peculiar property of the crown, correspond with what in Scotland are called regalia. Gifts of waifs, estrays, wrecks, treasure-trove, royal fish, and forfeitures, are franchises; so are the rights of forest, chase, park, warren, and fishery. A county palatine (see PALATINE) is the highest species of franchise. So the crown may create a liberty or bailiwick independent of the sheriff of the county. It is likewise a franchise for a number of persons to be incorporated, with a power to do corporate acts; also each member of such corporation is said to have a franchise. The right to hold a fair or market, or to establish a ferry, and to levy tolls therein, also is a franchise. Franchises may be extinguished by reunion with the crown or lost by *misuser* or by *non-user*. FRANCHISE, v. to enfranchise, which see. FRANCHISEMENT, n. in *OE.*, freedom; release. POLITICAL FRANCHISE, the right or privilege of voting; the right of the individual to exercise a certain limited portion of the general sovereignty of the state. A franchise in this sense is possible only in a free state—in a state in which the governed, as a whole, are identical with the governors. Where legislation is effected by the votes of the people themselves, as it was in the small states of antiquity, the franchise is exercised by each individual directly. Where representation has been introduced, the franchise is the right which the citizen has of voting for his representative. The extent or value which ought to belong to the franchise will be measured by the amount of the sovereignty which it expresses. But this sovereignty finds forms of actual expression, in the amount of power and influence which is conceded to the individual by the society of which he is a part; whence it may be claimed that the proper *practical* franchise would be one corresponding accurately to the social position of each individual. A *theoretically* just franchise would be one corresponding accurately to the rightful claim of each individual to power and influence—a claim based in every instance on moral character and practical wisdom and force. But an approximation is all that is possible in dealing with the mass; and one of the questions at present most keenly discussed among speculative politicians is, by what test shall this approximate estimate of social value be brought most nearly to the truth. Mill proposed intelligence, as indicated by instruction, as the sole measure of individual sovereignty, and, consequently, as the basis of the franchise. Others have proposed wealth; while a third class of speculators contend that, in the case of each individual, there are various elements of social importance which must be taken in account in determining the political value which is his due. By most recent writers on the theory of government, however, the idea of all citizens being entitled to an equal suffrage, however great the disparity of age, intelligence, education, moral worth, manhood, influence, wealth, and other elements which go to make up social importance, is repudiated as a scientific absurdity. It is questionable indeed whether the franchise

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can be claimed on the ground of a merely personal right by any one: it seems rather to combine the two elements of individual right, and of a grant by the state which ratifies that right and marks out the limits of its exercise. In such a grant by the community, the public welfare must be the decisive element; and it remains for the general wisdom to decide whether the public welfare will, on the whole, be best subserved by conferring the franchise on all citizens alike, or by conferring it on certain classes only; and whether such classes shall be formed according to age or sex, or intelligence, or moral worth, or education, or property, or according to any two or more of these. See Mill's work on Representative Government: also BALLOT: DEMOCRACY: GOVERNMENT: PARLIAMENT: REPRESENTATION: REPUBLIC: SUFFRAGE.

FRANCIA, *frân'châ*, FRANCESCO (FRANCESCO RAI-BOLINI): 1450—1517, Jan. 6; b. Bologna: painter. He was son of a carpenter, learned the goldsmith's trade with a noted master whose name he took, became eminent as goldsmith and engraver of dies, and held the offices of steward of goldsmiths and master of the Bologna mint. It is not known when he began studying or practicing painting, but his earliest known work, a Madonna surrounded by six saints, is dated 1494. It was painted in oil for the church of St. Maria della Misericordia on the order of the Bentivoglio family, who also employed him to fresco their palace. His works resembled those of Perugino at first and then of Raphael, with whom he became intimate.

FRANCIA, *frân'se-â* or *frân'the-â*, Dr. JOSÉ GASPARD RODRIGUEZ, Dictator of Paraguay: 1757 (or 8)—1840 (ruled 1814—40); b. near the town of Asuncion; son of a small landed proprietor, of French or Portuguese origin. He was intended for the priesthood, studied at the University of Cordova de Tucuman, where he took his degree as doctor of divinity or of canon law, and was for some time a theological professor. Subsequently he adopted the profession of law, and practiced 30 years, gaining much reputation for learning, skill, honesty, and independence. When he had attained the age of 52 or 53, the revolution which shattered the Spanish yoke in S. America broke out in Buenos Ayres. Paraguay at first offered active opposition to the revolutionists, but ultimately sought to obtain independence. F. was a leader in the movement, and was made sec. of the independent junta, but soon resigned. The conviction, however, being strong in the public mind that only F. could properly direct the new republic, he was, 1813, appointed joint-consul with Gen. Yegros. The latter seems to have lacked intellect or energy, and F. was really sole ruler from the first. In 1814, he was appointed dictator for three years, at the expiry of which time the dictatorship was given him for life; and he exercised absolute control (in all for 26 years) until his death. Under F., the condition of Paraguay rapidly improved, and the system of non-intercourse, political or commercial, with other nations, which he enforced, however much it may seem to indicate

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lack of administrative sagacity, was undoubtedly beneficial. So strict were the regulations against foreign intercourse, that ingress to, or egress from, Paraguay was next to impossible; and F.'s treatment of some foreigners who did enter (among others the famous savant Bonpland), and of others who were prevented entering, savored of harshness, and even barbarism. Yet his administrative talent was of a high order. He improved agriculture, making two crops of corn grow where only one had grown before. He introduced schools, promoted education, repressed superstition, and enforced strict justice between man and man in his law-courts. His death was regretted by the people as a public calamity—the best proof that he was no vulgar tyrant. See Rengger and Longchamp's *Essai Historique*, etc. (Paris 1827); *Francia's Reign of Terror* (London 1839), by J. P. and W. P. Robertson, two young Scotchmen whom F. turned out of the country; and T. Carlyle essay in the *Edinburgh Review* (1843).

FRANCIABIGIO, *frân-châ-bě'jo*, or FRANCIA BIGIO (FRANCESCO DI CRISTOFANO): 1482–1525; b. Florence: painter. He studied with Mariotto Albertinelli, and became associated with Andrea del Sarto 1505. In 1513, he painted the *Marriage of the Virgin* in the court of the Servi in Florence, as part of a series of frescoes designed by his associate; and, enraged at some monks who uncovered it before completion, nearly destroyed it with a hammer. As neither he nor any other painter would repair the fresco, it remains as he injured it. In 1518–19 he painted the *Departure of John the Baptist for the Desert* in a series of Andrea's frescoes at Lo Scanzo, and 1521 the *Triumph of Cicero* at the Medici Palace, Poggio a Caiano. He painted a large number of portraits which are in various collections in Europe.

FRANCIS, *frăn's'sis*, I., King of France: 1494, Sep. 12—1547, Mar. 31 (reigned 1515–1547); b. Cognac; son of Charles, Comte d'Angoulême. In youth he took delight in the romances of chivalry, whence, probably, he drew his brilliant but erroneous views of a kingly character. At the age of 20, he married Claude, daughter of Louis XII., and succeeded his father-in-law, 1515, Jan. 1. His first act was to undertake the reconquest of Milan, which had been wrested from his predecessor two years before; and at the head of 40,000 men, among whom were such great warriors as the Constable Bourbon, Bayard, Lautrec, and Trivulzio, F. crossed the Alps, and attacked the Swiss allies of the Milanese at Marignano, ten m. from Milan. Here a sanguinary battle, afterward called the 'battle of the giants,' ensued (1515, Sep. 13), in which F. obtained a complete victory—the Swiss losing 12,000 men. In accordance with his chivalrous propensities, F. accepted knighthood on the field from the renowned Bayard. After some further successes, F. returned to Paris 1516, Feb. On the death of Maximilian, emperor of Germany, 1519, Jan., F. and Charles of Spain became rival candidates for the imperial crown. The election of the latter excited the

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anger of F., who immediately prepared for war, and endeavored to secure the alliance of Henry VIII. of England. An interview took place 1520 between the two monarchs on the famous *field of the cloth of gold* between Guines and Ardres, but it led to no result, and shortly afterward Henry formed an alliance with the pope and the emperor against Francis. The papal troops drove the French out of Italy; and the soldiers of Henry and the emperor invaded France on the north, while, to complete his perplexities the constable Bourbon, who was discovered to be conspiring against his sovereign, fled to Charles, who gladly accepted the sword of the renegade warrior. F. gallantly faced the dangers that now threatened his kingdom. A large army was sent to Italy under the command of Bonnivet, who proved incapable, and was forced to retreat across the Alps. In the course of this retreat, Bayard lost his life. The imperialists now advanced into Provence, but on the approach of the French king, withdrew into Italy, whither they were followed by F., who overran Lombardy, but was totally defeated and taken prisoner at the battle of Pavia, 1525, Feb. 24. Charles carried his captive to Madrid, and granted him his liberty only on the hardest conditions. F. had to renounce the suzerainty of Flanders and Artois, the duchy of Burgundy, and all his Italian possessions and prerogatives, to promise the restoration of Bourbon to his former dignities, and to surrender his two sons as hostages. He obtained his freedom 1526, March 17; but regarding the conduct of Charles as utterly base, his first act, on his return to his dominions, was a refusal to fulfil the pledges that he had given. Pope Clement VII. absolved him from his oath; England, Rome, Venice, Florence, and Genoa—all or whom were growing alarmed at the immense power of Charles—withdrew from the imperial alliance, and sided with Francis. The war in Italy recommenced; and 1527, May 5, Bourbon's 'black banditti' stormed and sacked the 'Eternal City,' and captured the pope. F. now sent troops into Naples, which, after a series of brilliant successes, were almost wholly cut off by disease, mainly through the negligence of the king, who failed to supply them with the means of subsistence. About the same time, F. sent a challenge to Charles to decide their quarrel by single combat. The challenge was accepted, but the duel never was fought. At last, a peace was concluded at Cambray, 1529, July, much to the advantage of the Spaniards. In 1534, however, war broke out between F. and the Duke of Milan; and in the following year the former overran Savoy, to which he laid claim by the absurdest pretensions. The conduct of Charles at this period was marked by the greatest moderation, but he was ultimately involved in hostilities with his inveterate opponent. Little definite result ensued, but the war was marked by a circumstance regarded as horrible in those days—viz., an alliance between Christians and Turks. F. formally entered into a league with the Sultan Soliman, who went so far as to land troops in the south of Italy, but the French king shrunk from a practical co-operation with the arch-enemy

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of Christendom. By the efforts of Pope Paul III., a treaty was concluded at Nice between Charles and F., 1538, June 18. In fact, however, peace lasted only four years, and in 1542, F., insatiable of glory, launched five different armies against the emperor. The battle of Cerisolles, 1544, April 14, in which the French were completely victorious, partially wiped out the dishonor of the defeat at Pavia, but a second alliance of F. with the Turks renewed the indignation of Christendom. Charles, and Henry, King of England, marched upon Paris, and F. was compelled to make peace at Crepy, 1544, Sept. 18. His political rôle was now finished. He died at Rambouillet. It is not difficult to estimate the character of this monarch. Gay and voluptuous (it was the physical consequences of an amour which cost him his life), he was still capable of heroic impulses and acts of splendid generosity. But no amount of 'chivalry' could compensate for his lack of political sagacity; it could not even save him from deeds of cruelty. His persecution of the Vaudois and other 'heretics' has left a dark stain on his memory, which all his patronage of arts and letters will not efface.

FRANCIS II., King of France: 1543, Jan.—1560, Dec. 5 (reigned 1559–60); eldest son of Henry II. and Catharine de' Medici. He married Mary Stuart, Queen of Scots, 1558, and succeeded to the throne of his father 1559, July 10. He placed the direction of state affairs in the hands of the Duc de Guise and Card. Lorraine, uncles of his queen, and Rom. Catholics, and this act led the king of Navarre, Prince of Condé and other nobles to unite with the Protestants, then under persecution, against the Guises. The conspiracy was discovered 1560, and the Prince of Condé was condemned to death, but escaped by the death of the king. F. was succeeded by his brother, Charles IX.

FRANCIS I. (STEPHEN), Emperor of Germany: 1708–1765, Aug. (reigned 1745–65): eldest son of Leopold, Duke of Lorraine. On the death of his father 1729, F. succeeded him to the dukedom, which, 1739, he ceded to Stanislaus Leszcynski, father-in-law of Louis XV., to revert after his death to the crown of France. In lieu of Lorraine, he obtained the grand duchy of Tuscany, whose native rulers, the Medicean family, were about to die out. In 1736, he married Maria Theresa of Austria, only daughter and heir-ess of Emperor Charles VI. In 1740, Charles died, and Maria Theresa succeeded him; she made her husband co-regent with herself, but gave him little share in the administration. F. fought bravely for his wife's rights in the wars against Frederick the Great. In 1745, he was elected to the once important dignity of Emperor of Germany, and crowned at Frankfurt. The famous Seven Years' War (1756–63) then broke out between Austria and Prussia; but the cares which it imposed fell mainly upon his leonine consort Maria Theresa. F. died at Innsprück, and his son Joseph succeeded him in the imperial dignity, but Maria Theresa retained in her hands the sovereignty of the Austrian dominions till her death.

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FRANCIS II., Emperor of Germany (FRANCIS I. of Austria): 1768, Feb.—1835, Mar. 2 (reigned German Emp. 1792–1806; Austrian Emp., 1804–35); b. Florence; eldest son of Leopold II. Grand Duke of Tuscany, and of Maria Louisa, daughter of Charles III., king of Spain. In 1790, his father became Emperor of Austria by the death of his brother Joseph, but died only two years afterward when the crown devolved upon Francis. The French Revolution was now exciting the alarm of the old European dynasties; F. concluded an alliance with Prussia against the new republic: and the armies of the allies marched to the frontiers of France, but soon recoiled before the fiery enthusiasm of the republican troops. In 1794, F. placed himself at the head of the army of the Netherlands, which, April 26, defeated the French at Cateau and Landrecy; and May 22, gained the bloody battle of Tournay; but on the whole the fortune of the war was against him; and the triumphs of young Gen. Bonaparte in Italy forced F. to conclude the treaty of Campo Formio, 1807, Oct. 17. Only two years afterward, however, F., in alliance with Russia and England, again took up arms, and was at first successful; but the recall of the brave Russian general, Suwaroff, and the return of Bonaparte from the East, quickly altered the state of matters. The great victories won by Moreau at Hohenlinden, and by Bonaparte at Marengo, paralyzed the powers of Austria, and F. was compelled to sue for peace, which was obtained by the treaty of Lunéville, 1801, by which the whole of the left bank of the Rhine was ceded to France. In 1805, the aggressions of France once more excited the jealousy of Austria. F. entered into a new alliance with Russia; and the contest was renewed, but ended more disastrously than ever for the Austrians. The French victories of Ulm and Austerlitz, and the capture of Vienna, completely humiliated F., who at the peace of Presburg (1805, Dec.) was obliged to surrender the Venetian states and the Tyrol. The German empire was now dissolved, after lasting for 1,000 years; F. assumed (1804) the inapt title of Emperor of Austria, King of Bohemia and Hungary. In 1809, he recommenced the war with Napoleon, and obtained more success, or encountered less loss than on previous occasions. The tremendous battle of Aspern *was* a victory, though not decisive, and did much to restore the prestige of the Austrian arms. Still Napoleon again got possession of Vienna, and dictated terms of peace from the palace of Schönbrunn in Oct. of the same year. In 1810, the French Emperor married F.'s daughter, Maria Louisa. A permanent friendly alliance now seemed concluded between the two empires; and during the Russian campaign 1812, the Austrians rendered the French some slight assistance. In 1813, Austria resumed its neutrality; but F., after having exerted himself fruitlessly to mediate between France and Russia, suddenly joined the allies, helped to win the battle of Leipsic, and followed the Russians and Prussians to Paris 1814. His subsequent career presents no points of importance. He labored honestly and indefatigably for the welfare of his subjects, encourag-

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ing the making of roads and canals, and the introduction of manufactures; but his horror of everything revolutionary, excited by his early recollections, and by the cruel death of his aunt Marie Antoinette, and kept alive by his long wars with France, had rendered him an absolutist in politics, and a lover of that system of centralization to which Austria clings.

FRANCIS I., King of the Two Sicilies: 1777, Aug. 19—1830, Nov. 8 (reigned 1825–30); son of Ferdinand I. of Naples and of Caroline Maria of Austria. He became heir to the throne on the death of his elder brother 1778, married Maria Clementina, daughter of Emperor Leopold II. 1797, and a daughter of Charles IV. of Spain 1801; was appointed regent of Naples 1812, proclaimed a constitutional form of govt. and was deposed by his father 1813, returned to Naples 1815, was appointed by his father gov. of Sicily, and was reinstated as regent of Naples 1820. He succeeded his father 1825, Jan. 4, and after a reign noted for mismanagement, corruption and the massacre at Bosco, was succeeded by his son, Ferdinand II.

FRANCIS II., King of the Two Sicilies: b. 1836, Jan. 16 (reigned 1859–60); son of Ferdinand II. (*Bomba*) and of Princess Christina of Savoy. He married Princess Caroline, daughter of Maximilian Joseph of Bavaria and sister of the empress of Austria, 1859, and soon afterward (May 22) succeeded to his father's throne. Declining Victor Emmanuel's invitation to join him against Austria, he continued the reactionary policy of his father, and so stirred up his subjects that they revolted 1860. Garibaldi (q.v.) headed an expedition which, landing in Sicily, defeated the Neapolitan army in every encounter. F. sought foreign intervention in vain, did nothing to conciliate his subjects, and fled from Naples with his family to the Gaeta fortress on the eve of Garibaldi's entrance into the city. After a siege of six months he surrendered with the garrison to the Sardinia troops 1861, Feb. 14. He has since resided in Rome, and his former possessions are now a part of the kingdom of Italy.

FRANCIS DE SALES, *sâl* or *sâ'lës*, sometimes *sâlz*, SAINT: 1565, Aug. 21—1622, Dec. 28; b. near Annecy, Savoy: Rom. Cath. bp. He was of noble birth, was educated in the College of Annecy, the Jesuit school in Paris, and the law school in Padua, and received the degree LL.D. at the latter when 20 years old. His family and friends desired that he should seek a political career, and the office of senator was offered him several times without acceptance. His preference was for an ecclesiastical life, and on obtaining his father's permission he became provost and then deacon of the Cathedral of Geneva. Here he attracted attention by his eloquence and power as a preacher, and his advancement was rapid. He was raised to the priesthood 1593, and then entered upon a remarkable series of missionary labors. He first visited the prisons and abodes of poverty in the neighboring villages, then with a cousin went to the province of Chablais and began work among

the Protestants. Through his efforts many Prot. ministers were expelled, and the Rom. Cath. communion was restored 1598. The pope commissioned him to convert the influential Theodore Beza, but though he offered him the rank of cardinal he was wholly unsuccessful. In 1599 he was appointed coadjutor to the bp. of Geneva, and became his successor 1602. Soon afterward he went to Paris, preached before Henry IV., and was urged with grand offers of wealth and rank to remain in France, but he rejected all the royal overtures, and after taking part in establishing the Carmelite order and the Congregation of the Oratory, returned to Switzerland, and applied himself with renewed zeal to missionary labor and the spiritual improvement of the church. A strong believer in the value of monastic institutions, he established many convents of existing orders, and with the aid of the widow of Baron de Chantal, whom he met in Paris 1604, founded the new Order of the Visitation for the relief of the sick and the poor 1610, with the mother-house at Annecy. His high reputation as preacher, arbitrator, and missionary, and his eminent success in the work of conversion, were augmented 1608 by the publication of his *L'Introduction a la vie d'evote*, which was widely translated and had an enormous sale. He followed this, 1616, with *Traité de l'amour de Dieu*, and was soon afterward relieved of much of the burden of his work through the appointment of a younger brother as his coadjutor. In 1619 he was appointed a member of the embassy sent to France to seek the hand of Princess Christina for the prince of Piedmont, and while in Paris preached to great audiences. In 1622 he was invited to accompany Louis XIII. of France on his journey from Avignon to Lyons, and shortly after preaching in the latter city on Christmas day was fatally stricken with apoplexy. He was canonized 1665.

FRANCIS, JOHN WAKEFIELD, M.D., LL.D.: 1789, Nov. 17—1861, Feb. 8; b. New York: physician. He graduated at Columbia College 1809 and at the College of Physicians and Surgeons 1811, established a partnership with his preceptor, David Hosack, M.D., and was associated with him in the publication of the *American Medical and Philosophical Register* 1810-14. In 1813 he was appointed prof. of materia medica in Columbia College, 1816 went to Europe and studied with Dr. Abernethy, and on his return to New York resumed labor in the college as prof. of the institutes of medicine, of medical jurisprudence, and of obstetrics, successively till 1826. At the organization of the Rutgers Med. School 1826 he became prof. of obstetrics there and served four years. He spent the remainder of his life in private practice, the promotion of medical, benevolent, historical, and art interests, and in literature. He was elected pres. of the New York Acad. of Medicine at its organization 1847, and was connected with numerous societies in this country and abroad. He received the degree LL.D. from Trinity College 1850.

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FRANCIS OF ASSISI, SAINT: founder of the Franciscan order: 1182–1226, Oct. 4; b. Assisi, Italy; son of a trader, of the family called Bernardini. He was one of the most extraordinary men of his age, illustrating in his career all the most remarkable characteristics of the religious life of the middle age. His baptismal name was John; but from his familiarity with the Romance, or language of the troubadours, in his youth, he acquired the name of *Il Francesco* ('The little Frenchman'). In his early years, he was remarkable for love of gayety and ostentatious prodigality; but even then his bounty to the poor was one of the chief lines of his wastefulness. He engaged eagerly in exercises of chivalry and of arms; and in one of the petty feuds of the time, he was taken prisoner, and detained for a year in captivity at Perugia. An illness which he there contracted turned his thoughts from earth; and although he again engaged in military pursuits, a second illness at Spoleto decided his career for life. He then resolved to fulfil literally the counsels of the gospel, and he devoted himself especially to poverty, which, in the mystic language thenceforth familiar to him, he designated as 'his bride.' Under an impulse which he received while listening to a sermon, he took a vow never to refuse alms to a beggar. He made a pilgrimage to the tomb of St. Peter at Rome, and there offered to God all that he possessed on earth. On his return to Assisi, he exchanged his clothes with a poor mendicant; and disregarding all remonstrance and ridicule, he ever afterward continued to wear the meanest attire. He gave to a priest who was rebuilding a ruined church the price of his horse, which he sold for the purpose, and even sought to appropriate to the same use the moneys of his father, which, however, the priest refused to accept. To avoid his father's anger, he took refuge in a cave, in which he spent a month in solitary prayer, and from which he returned more than ever confirmed in his enthusiasm. His father having in vain confined him in a dark room of his own house, cited him before the magistrates—and, on F.'s declining all civil jurisdiction in such a case, before the bishop—in order to compel him to renounce his inheritance. F. abandoned all, even to the very clothes he wore, and then declared that 'till now he had been the son of Bernardini, but that henceforth he had but one Father, Him that is in heaven.' Thenceforth, no humiliation was too low for F.; he begged at the gates of monasteries; he discharged the most menial offices; he served the lepers in the hospital at Gubbio in their most revolting necessities, and with tenderest assiduity. He worked with his own hands at the building of the church of St. Damian, and at that of Sta. Maria degli Angeli, which he afterward called his 'Portiuncula,' or 'little inheritance;' and as the last act of self-spoliation, and the final acceptance of the gift of poverty, he threw aside his wallet, his staff, and his shoes, and arrayed himself in a single brown tunic, of course woollen cloth, girt with a hempen cord. This was in his 26th year, in 1208. His enthusiasm by degrees excited emulation. Two of his fellow-towns-

men, Bernard Quintavalle and Peter Cattano, were his first associates. They were followed, though slowly, by others; and it was not till 1210, that, his brotherhood having now increased to 11, he drew up for them a rule, selected in the true spirit of religious enthusiasm, by thrice opening at random the gospels upon the altar, and taking the passages thus indicated as the basis of the young institute. (Milman's *Latin Christianity*, IV. 264.) The new brethren repaired to Rome, where their rule was approved (though at first only *viva voce*) by Pope Innocent III. 1210. The two following years were spent by the brotherhood in preaching and exhorting the people through the rural districts of their own and the adjoining provinces; and F. himself returned to Assisi 1212, at which time he finally settled the simple constitution of his order, the church of Sta. Maria degli Angeli being assigned to them as their home. In common with the older forms of monastic life, the Franciscan institute is founded on the three vows of chastity, poverty, and obedience; but of these the second was, in the eyes of F., the first in importance and in spiritual efficacy. In other orders, the practice of poverty consisted in the mere negation of riches. With F. it was an active and positive principle. In other orders, though the individuals could not possess, it was lawful for the community to hold, property in common. F. repudiated all idea of property, alike for his order and for its members; he even disclaimed for them the property in those things which they retained for personal use—the clothes which they wore, the cord with which they were girded, the very breviary from which they chanted the divine office. The very impossibility, to human seeming, of these vows, was their strength. Numbers crowded to the standard of Francis. He assigned them in parties to different provinces of Italy. Five of the brotherhood repaired to Morocco to preach to the Moors, and, as the first martyrs of the order, fell victims to their holy daring. Success removed all the hesitation with which the institute at first was regarded, and 1216, the order was solemnly approved by Pope Innocent. From this date it increased with extraordinary rapidity. At the first general assembly, (1219) 5,000 members were present; 500 more were claimants for admission. F. himself inaugurated the future missionary character of his brotherhood by going (1223) to the East, and preaching the gospel in the presence of the sultan himself; but the only fruit of his mission was a promise from the sultan of more indulgent treatment for the Christian captives, and, for the Franciscan order, the privilege which they have since enjoyed, as guardians of the Church of the Holy Sepulchre. It is after his return to Italy that his biographers place the celebrated legend, to friends or to enemies so long a subject of veneration, or of ridicule—his receiving, while in an ecstasy of prayer, the marks (*stigmata*) upon his own person of the wounds of our Divine Redeemer. The scene of this event is laid on Monte Alverno, a place still sacred in the traditions of the order; and the date 1224, Sep. 17. Two years later, St. F. died. On the approach of his last hour, he requested that

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he should be carried upon a bier to the church, where he had himself placed on the bare ground, thus realizing in his own death the most literal extreme of the doctrine which he had made in life the basis of his system. He was canonized by Pope Gregory IX. 1228.

The works of St. F. (folio, Pedeponti 1739) consist of letters, sermons, ascetic treatises, proverbs, moral apothegms, and hymns. The latter are among the earliest metrical specimens of the Italian language. They are exceedingly simple, and full of the tenderest expressions of the love of God. His prose is often more poetical than his poetry, abounding in allegory and poetical personification. Few writers have ever turned the love and admiration of external nature to a purpose so beautifully devotional. 'Of all the saints,' says Dean Milman, 'St. Francis was the most blameless and gentle.' No saint, it may be added, has been the subject of more exaggerated panegyric from the writers of his order; and one of the works in his praise—a parallel between St. F. and the Divine Redeemer—is disowned by the Rom. Cath. community as a reprehensible exaggeration, the fruit of an affectionate, but misdirected zeal for the memory of the founder of the Franciscan order.

See the Bollandist, *Acta Sanctorum*, Oct. 4; St. Bonaventure's Life of St. Francis, with Wadding's notes; Helyot, *Hist. des Ordres Religieux*, tom. VII.; Butler's *Lives of Saints*, Oct. 4; Milman's *Latin Christianity*, IV.; Gieseler's *Church History*, III.; Hase's *Franz von Assisi*; Mrs. Oliphant's *F. of Assisi* (1871).

FRAN'CIS OF PAOLA, SAINT: see MINIMS: FRANCISCANS.

FRANCIS, Sir PHILIP: 1740, Oct. 22—1818, Dec. 22; b. Dublin; son of the Rev. Dr. Philip F., who wrote a well-known translation of Horace. He was educated at St. Paul's School, London. In 1756, he obtained a place in the office of Mr. Fox, then sec. of state, which he retained under his successor Mr. Pitt. In 1760, he became sec. to the British ambassador to Portugal; and on his return to England 1763, he received an appointment in the war-office. Ten years later, he was sent to India, as a member of the council for the government of Bengal, with a salary of £10,000. Here he came into collision with the gov. gen. Warren Hastings, and a duel was the consequence, in which F. was severely wounded. In 1780, he resigned his situation, and 1784, entered parliament for the borough of Yarmouth, in the Isle of Wight. He never obtained a reputation as an orator, but his great abilities and extensive information always commanded the respect and attention of the house. The prosecution of Hastings, begun 1786, was hailed by him with malignant joy. In his political opinions, F. was a decided and consistent whig, at a time when whiggism meant much the same as the radicalism of a later period. He exulted at the success of the French Revolution, was an active member of the assoc. of 'Friends of the People,' and ably supported the efforts of Fox and Grey for a reform in the representation of the nation. He

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withdrew from parliament 1807. F. wrote more than 20 political pamphlets. He has also been considered by many to have the best claim to the authorship of the *Letters of Junius* (q.v.).

FRAN' CIS BORGIA, *bor'já*, SAINT: 1510, Oct. 10—1572, Sep. 30; b. Gandia (Valencia): gen. of the Soc. of Jesus. He was a son of John, Duke of Gandia, was educated by his uncle, abp. of Saragossa. and having a desire for a monastic life was sent by his father to the court of Charles V. to divert his thoughts, 1528. There he married a Portuguese lady of high rank, was created marquis of Lombay, and appointed master of the empress's horse. In 1535 he accompanied Charles on his expedition to Africa and 1536 to Provence, and 1539 escorted the dead body of the empress to Granada. Returning to Toledo, he was appointed viceroy of Catalonia and commander of the order of St. James. In 1543 he succeeded his father in the dukedom, resigned his viceroyalty and retired to Gandia, where on the death of his wife 1546 he joined the order of Jesuits and built a college for them. He visited Rome and gave the money to build the Collegium Romanum 1550; resigned his rank and estate to his eldest son, assumed the Jesuit habit, and was ordained priest 1551, was appointed commissary-gen. of the order in Spain, Portugal, and the Indies 1554; and was chosen its third gen. 1565. He was beatified 1624 and canonized 1671.

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FRANCISCAN, n. *frän-sis'kän* [from St. *Francis*]: one of an order of monks or friars founded 1209: ADJ. pertaining to.

FRANCISCANS, *frän-sis'kanz*, ORDER OF (called also GRAY FRIARS, and MINORITES or LESSER BRETHREN): religious order of the Rom. Cath. Church, founded by St. Francis of Assisi. For an account of the establishment of the Franciscan order, and its earliest fortunes, see FRANCIS OF ASSISI. The subsequent progress of the order was equally wonderful. In less than half a century it reckoned no fewer than 33 'provinces,' the aggregate number of convents in which exceeded 8,000, while the members fell little, if at all, short of 200,000. Some idea of the extension of this remarkable institute may be formed from the startling fact, that, in the dreadful plague of the Black Death in the following century, no fewer than 124,000 Franciscans fell victims to their zeal for the care of the sick, and for the spiritual ministration to the dying. But this marvellous external progress was accompanied by serious internal controversies and divisions. In the original scheme of the institute, its great fundamental characteristic was poverty, which St. Francis proposed to render in his order not only more perfect theoretically, but more systematical in its practice, than in any of the contemporary institutes. For the accomplishment of this design, the rule which he drew up contained a few brief and simple, but, understood literally, very affectual provisions; but the difficulty of their literal observance led, even in the lifetime of St. Francis, to an attempt in the general assembly of the order to introduce important modifications; and, though the authority of the founder was sufficient to prevent the adoption of these modifications during his lifetime, and though his last will contained a special clause prohibiting not merely all change of the rule, but even all interpretation of it, the attempt was renewed with still more determination under Brother Elias, his successor in the office of gen. of the order. The great subject of controversy was the nature and extent of the obligation of religious poverty, as vowed in the order. Francis desired that it should be understood in the most rigorous sense; and, in his scheme of poverty, neither the individual brethren nor the entire community could acquire or retain any right of property even in things of necessary use. The rigorous party in the order sought to carry out this principle to the fullest extent; and they contended that it was unlawful for the order to acquire a right of property in houses, convents, or even churches; restricting their right in everything which they possessed to the simple use. Several successive popes sought, by explanatory decrees, to settle the dispute; and for a time a compromise was received, by which it was understood that the right of property in all *de facto* possessions of the order was vested in the see of Rome; but the foundations of the real controversy lay deeper than this. They regarded the practice, for more than the theory, of poverty; and the disputes to which they led eventuated not only in the formation of fresh offsets from the body in the new religious orders noticed below, but also in a large,

and, for a time, formidable, secession from the church in the sect of the Fraticellians: see FRATICELLIANS.

The supreme government of the F. which is commonly said to be the especial embodiment of the democratic element in the Rom. Cath. Church, is vested in an elective general who resides at Rome. The subordinate superiors are, first, the 'provincial,' who presides over all the brethren in a province; secondly the 'guardian,' head of a single convent or community. These officers are elected for only two years. The provincial alone has power to admit candidates, who are subjected to a probation of two years (see NOVITIATE); after which they are, if approved, permitted to take the vows of the order. Those of the members who are advanced to holy orders take a preparatory course of study, during which they are called 'scholars;' and if eventually promoted to the priesthood, they are styled 'fathers' of the order; the title of the other members being 'brother' or 'lay-brother.'

A very important feature, however, of the organization of the F., as it subsequently became of other orders, is the enrolment of non-conventual members, who continue to live in society without the obligation of celibacy; and in general, are bound only by the spirit, and not the letter, of the rule. They are called 'Tertiaries,' or members of the Third Order of St. Francis: see TERTIARY. It is impossible to overestimate the value of this institution in the disorganized social condition of that age. The Tertiaries were bound, as the very first condition of enrolment, to restore all ill-gotten goods; to be reconciled with all those with whom they had been at feud; to devote themselves to the practice of works of Christian charity; to avoid all unnecessary expenditure; to renounce the use of personal ornaments; to hear mass daily; to serve the sick and the hospitals; to instruct the ignorant; and, in a word, to practice as far as possible in the world the substance of the virtues of the cloister. The institute, in this form, undoubtedly exercised a powerful influence in mediæval society. It counted members in every rank, from the throne to the cottage; and though it was in some instances deformed by abuses and superstitious practices, the aggregate results were undoubtedly beneficial.

The F. has been the parent of many other religious institutes. The earliest of these is that of the 'Observantists,' or 'brethren of more strict observance.' The origin of this body has been already indicated. The party in the order which contended for the more rigid observance of the rule, after a protracted struggle—in which disaffection to the church itself was often strongly exhibited—obtained a separate organization, which may be said to have been finally settled at the time of Leo X. The less rigid party, under the name of 'Conventuals,' obtained a distinct general, and an authorization for their mitigated observance of the rule. Their churches and convents admit greater richness of architecture and decoration; and they are at liberty to acquire and retain, in the name of the order, the property of these and similar possessions, all of

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which are renounced by the Observant Franciscans. The latter community comprises nearly 150 provinces. Their constitution is that of the original rule, as above explained. A second offshoot of the F., and in the same direction of rigorism, is that known-as the 'Capuchin,' founded by Matteo de Basio, a Franciscan brother of the Observant rule, early in the 16th c. Believing himself divinely called to revive the old spirit of his order, and learning that the modern habit of the brethren was different from that of St. Francis, he began with externals, and procured for himself, and obtained the papal permission to introduce (1528), the peculiar habit, with a pointed hood or cowl (capute), from which the name of the reformed order is derived. Together with this habit, however, Matteo adopted a very rigorous and mortified course of life, in which he was joined by others of the brethren; and the reform spread so rapidly among the community, that in 1536 a general chapter of the new congregation was held. They were subject, however, to the jurisdiction of the gen. of the Franciscan order. One of the first generals of the new reform was Bernardino Ochino, afterward notable by his defection to Calvinism. After the Council of Trent, the Capuchins multiplied rapidly, though they were not introduced into France till the end of that century. A similar reform, to which the name of 'Recollets' was given (introduced into Spain by John de Guadeloupe, 1500), was approved by Clement VII. 1532; and many of the new brethren were among the first Spanish missionaries to the New World. A further development of the rigoristic spirit is the congregation of 'Discalced' or 'Barefooted' (q.v.) Franciscans. The author of this reform was a Spanish Capuchin, Peter of Alcantra. In his capacity of provincial of Estremadura, Peter introduced many reforms; and in 1555 obtained the approval of Pope Julius III. for a new rule, afterward confirmed by Pius IV.

Several orders of nuns had place in the Franciscan institute; as those of St. Clare, the Capuchinesses, the Urbanist nuns, etc.; forming part of the same general organization.

The F., in these several branches, has at all times maintained its popularity in the Rom. Cath. Church. When Helyot, in the beginning of the 18th c., published his great *History of Religious Orders*, the F. numbered nearly 120,000 friars, distributed over above 7,000 convents, and nearly 30,000 nuns, occupying about 900 convents. Since the French Revolution, the number has been much diminished, the order having been suppressed in more than one kingdom, but it is still one of the most numerous in the Rom. Cath. Church. Many of the foreign missions are supplied mainly by F., and they possess convents in almost every part of the world.

As a literary order, the F. have been eminent chiefly in the theological sciences. The great school of the Scotists takes its name from John Duns Scotus (see SCOTUS), a Franciscan friar, and it has been the pride of this order to maintain his distinctive doctrines both in philosophy and

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In theology against the rival school of the Thomists, to which the Dominican order gave its allegiance: see THOMISTS. In the Nominalistic controversy, the Thomists were for the most part Conceptualists; the F. adhered to the rigid Realism: see NOMINALISM. In the Free-will question, the F. strenuously resisted the Thomist doctrine of 'predetermining decrees.' Indeed, all the greatest names of the early Scotist school are the Franciscans, St. Bonaventure, Alexander de Hales, and Ockham. The single name of Roger Bacon, the marvel of mediæval letters, the divine, the philosopher, the linguist, the experimentalist, the practical mechanician, would in itself have sufficed to make the reputation of his order, had his contemporaries not failed to appreciate his merit. Two centuries later, the great Cardinal Ximenes was a member of this order. The Popes Nicholas IV., Alexander V., Sextus IV., the still more celebrated Sixtus V., and the well-known Ganganelli, Clement XIV., also belonged to the institute of St. Francis. In history, this order is less distinguished; but its own annalist, Luke Wadding, Irish Franciscan, bears a deservedly high reputation as a historian. In lighter literature, and particularly poetry, we have already named the founder himself as a sacred poet. Jacopone da Todi, a Franciscan, is one of the most characteristic of the mediæval hymn-writers. and in later times, the celebrated Lope de Vega closed his eventful career as a member of the third order of St. Francis. We may add that in the revival of art the F. bore an active and, no less a liberal and enlightened part. See Wadding, *Annales Minorum Fratrum*, 8 vols.; also Milman's *Latin Christianity*, V.

FRANCISCEA, n. *frân-sîs'sê-a* [named after *Francis*, Emperor of Austria, patron of botany]: genus of *Scrophulariaceæ*, tribe *Salpiglossideæ*. By some it is made a synonym of *Brunfelsia*, or is merged in that genus. *F. uniflora*, is a Brazilian shrub possessing purgative, emetic, emmenagogic, and alexipharmic properties, and is nausiously bitter. The root and bark are much used for syphilis, under the name of *Mercurio vegetal* (vegetable mercury).

FRANCIS'CO, SAN: see SAN FRANCISCO.

FRANCIS JO'SEPH, Emperor of Austria: b. 1830, Aug. 18 (began to reign 1848, Dec. 2); eldest son of Archduke Francis (son of Emperor Francis I.), and Sophia, a princess of Bavaria. F. was taught to speak all the various languages of his heterogeneous dominions, and only the year before the Hungarian revolution addressed the Magyar nobles at Pesth in their own language—a circumstance which secured him a certain transient popularity. In 1848, he served under Radetzky in the Italian wars. Emperor Ferdinand having, in the hour of his extremity, made certain constitutional promises to the nation, the archduchess, F.'s mother, who during the whole year had directed the schemes of the anti-revolutionary party, resolved that the fulfilment of these promises should be evaded by a change of sovereign. Ferdinand accordingly abdicated in favor of his nephew (1848), and F. assumed the govt. as Em-

peror of Austria, and King of Hungary and Bohemia. Hungary, however, which had lost all faith in the House of Hapsburg, rose in arms, and refused to accede to the change of succession; and Italy again tried the fortune of war. For the struggle between F. and the constitutionalists of Hungary, see the biographies of Kossuth, Bem-Dembsinski, Batthyani, etc. Suffice it to say that Austria triumphed in Italy, and in Hungary, through the alleged treachery of Görgei and the help of Russia. F. now devoted himself, with characteristic persistency, to the re-establishment of 'order,' that is to say, of despotism. He dissolved the national guard, and took away the freedom of the press, and 1852, Jan. 1, abolished the constitution of his uncle, a dead-letter from the beginning. In 1853 he nearly lost his life by assassination, and in the Crimean war forfeited the respect of all the belligerents by his indecisive attitude. The *concordat* of 1855, by which certain extraordinary privileges were conferred on the bishops of the Rom. Cath. Church, was another step backward. Meanwhile the dissatisfaction of Lombardy, Venice, and Hungary hourly increased. Sardinia encouraged the national feeling in Italy, and at last, 1859, F. hurried thoughtlessly into a war with that kingdom, which ended in the cession of Lombardy. For the war with Denmark, see SLESVIG; for the war with Prussia, and the subsequent work of reconstructing the empire, see GERMANY. F. was crowned at Pesth, 1867, as king of Hungary. See AUSTRIA: HUNGARY: and a life of F. by Emmer (1880).

FRANCKE, *fränk'eh*, AUGUST HERMANN: 1663-1727, June 8; b. Lubeck: German philanthropist, founder of the Orphan Asylum and several educational institutions at Halle. Having studied languages and theology with great application and success, he first attracted attention by his academical biblical lectures in Leipsic, begun about 1685. These were distinguished for piety, warmth, and zeal, more than for attention to the strict and dry orthodoxy then in vogue; and their popularity brought on F. persecution as a heretic. He thought proper to yield to the storm, and withdrew 1690 to Erfurt. In 1692, he became prof. of Oriental languages in the new univ. at Halle, where he afterward was prof. of theology. He received also the pastoral charge of the suburb of Glaucha, where the ignorance and poverty of his parishioners gave the first impulse to his benevolent labors. The neglected poor and children that came to him for alms, he gave instruction on stated days; and as others joined, paying a school-fee of a penny a week, and the numbers rose to abt. 60 he divided them into classes, and thus laid the foundation of his educational establishments. At the same time the thought suggested itself of an orphan asylum, and 1698 he laid the foundation of a special building for the asylum. Some years later he erected a Pedagogium and a Latin school with a boarding establishment. In 1714, there were 1,075 boys and 700 girls receiving instruction from 108 teachers under the direction of Francke. He had also a missionary institution for the East Indies. To erect and maintain all

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these establishments required large sums of money; and it is surprising how F. obtained funds without assistance from government. But so high was his reputation for disinterested benevolence, and in such a practical way did he set about his undertakings, never appealing for the charitable aid of others till he had first effected something himself, that contributions flowed in from all parts of Germany, and even from abroad. F. instituted an apothecary's shop and bookselling in connection with his other operations, and thus obtained a considerable income for their support. Amid all these voluntary labors he did not neglect his duties as professor and pastor; he preached and lectured regularly, and found time to study and write.—Francke's Institution as it now exists in Halle, embraces the orphan house and schools erected by F., together with others since added; the number of pupils amounting in all to more 3,500. Bookselling, printing, and a laboratory for the preparation and distribution of medicines are carried on in connection with education. The revenues consist of the profits of this industry, of the income from some property in land and funds, and of an allowance of abt. \$30,000 from the state. The education imparted retains its religious character, but the excessive number of prayers and the otherwise conventual and ascetic character of the discipline have been diminished.

FRANCK'LIN: see FRANKLIN.

FRANCO, prefix *fräng'kō* [L. *Francus*, a Frank]: French, as the *Franco*-Prussian or *Franco*-German war of 1870-1.

FRANCOA, n. *fräng-kō'a* [named by Cavanilles, after F. *Franco* of Valentia, patron of botany in the 16th c.]: typical genus of *Francoaceæ*, an order of hypogynous exogens, alliance *Ericales*. They are used for medicine and for dyeing black.

FRANCO-GERMAN WAR.

FRANCO-GERMAN WAR: between France and Germany, 1870-71. The results of the war between Prussia and Austria 1866 placed Prussia in a more important position in the eyes of Europe than it had occupied for many years. The crowning successes of the Prussian armies at Sadowa revived the long-standing enmity between France and Germany, and led Napoleon III. to consider his empire in danger of losing the military and political supremacy of Europe. Subsequent events led to the belief that Napoleon began preparing for war with Germany while the smoke of battle still hung over the bloody field of Sadowa. The Chassepot rifle, then the most destructive weapon of its kind known, was introduced in the army, and by the close of 1869 was in the hands of every infantryman. The army, apparently, had a strength of nearly 1,500,000 men: 900,000 in the active army and reserve, and 550,000 enlisted especially for frontier duty, in the national guard. The navy was quietly reorganized, strengthened, and placed on an extreme war footing. Before the close of 1869 Napoleon became fixed in the delusion that France was fully capable of waging a successful war upon Prussia. That he was grossly deceived and that France was in no condition for such a struggle were proved by the early and successive disasters of his armies, notwithstanding the brilliant achievements of some of his generals. Resting in the confidence of the invincibility of his army and navy, Napoleon's next concern was to seek a convenient pretext for declaring war. He had vainly sought of Prince Bismarck an offensive and defensive alliance, agreeing to recognize the efforts of Germany for nullification in return for the annexation of Belgium and Luxembourg to France. Bismarck refused repeated and varying overtures, and continued to perfect his plans for a union of n. and s. Germany. As state after state gave its adhesion to the chancellor's scheme, the French became alarmed at the rapid advance of a political movement that was sure to create an adversary superior in strength to themselves. The appointment of the Duc de Gramont as minister of foreign affairs, in Emile Ollivier's cabinet, the adoption of a warlike tone in the policy of his department, and the active encouragement of belligerent sentiments by Empress Eugenie, hastened the empire to its fall. In 1870, July, Prince Leopold of Hohenzollern became a candidate for the crown of Spain, Premier Ollivier and the Duc de Gramont on learning the fact declared in the corps legislatif that such a candidature, entered upon without the knowledge of the French govt., could not be permitted by France. It was thought that King William, as head of the house of Prussia, could be induced to forbid the acceptance of the Spanish crown by Prince Leopold, and Count Benedetti was sent to Ems where King William was staying while using the waters, to make the demand. Benedetti made and repeated the demand July 9, 11, 13; the King declined to recall the consent he had given to Leopold not as king but as chief of the family; Leopold voluntarily renounced the crown July 12; Benedetti asked the king for

a pledge that he would not permit the prince to resume his candidature; the king peremptorily refused; and when Benedetti attempted a fourth audience William declined to receive him. On July 14 Prussia withdrew her representative at the French court; on the 15th the French assembly was informed of the preceding events, and despite great opposition voted 500,000,000 fr. for war; England and the pope hastened proffers of mediation; but on the 19th war was formally declared by France. While in France the war party was assuming great activity, in Berlin a feeling of calmness prevailed, as it was not believed that France would dare proceed to extreme measures. But within an hour after the reception of the news of the French appropriation for war, the capital was aroused. The king hurried from Ems, and after consulting with his advisers ordered the mobilization of the entire army of the North German Confederation, and the assembly of the federal council and the parliament. Contrary to French expectation, Bavaria, Baden, Hesse, and Württemberg at once mobilized their armies and placed them at the disposal of King William. Other South German states followed their example, and Germany was practically united within a week by instinctive action. Instead of the grand army which official reports told Napoleon he could have in the event of war, the active army numbered only about 427,000 men; there were 87,000 regular reserves in addition, and a further force chiefly on garrison duty of 157,000. Germany had at her disposal immediately after the declaration of war an active army of 447,000 men, a first reserve of 188,000, a second of 225,000, and the landwehr. From their active forces the belligerents assembled their armies as follows: France; army of the Rhine; 1st corps under Marshal MacMahon, near Strasburg; 2nd (Gen. Frossard), toward the Prussian frontier near St. Avold; 3d (Marshal Bazaine), near Metz; 4th (Gen. L'Admirault), near Theonville; 5th (Gen. Faily), palatinate frontier near Bitsch; 7th (Gen. Douay), at Belfort; and the reserves (Gens. Bourbaki and Canrobert), at Nancy and Châlons. Germany: 1st army (Gen. von Steinmetz), as right wing, near Treves; 2nd (Prince Frederick Charles), in the Rhenish palatinate near Bitsch; 3d (Crown Prince Frederick), on the Baden frontier from Mannheim to Rastadt. Napoleon took the field in person July 29 with headquarters at Metz, and King William as commander in chief of the German armies, established himself at Mentz, Aug. 2.—Hostilities began Aug. 2, when three French divisions attacked and occupied Saarbrück, driving out a garrison of 1,300 men. Both armies advanced rapidly to the frontier. On Aug. 4 the command of the crown prince passed through the forests of Bien, reached the neighborhood of Weissenburg, attacked the French div. under Gen. Ducrot, and after 5 hours' hard fighting forced them to retreat with the loss of their commander. Marshal MacMahon with the main body of his command took position at Wörth, mustering about 50,000 men to oppose the crown prince. On the 5th the Germans advanced

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to Sulz, and disposed corps at Lembach, Ingolsheim, Preuschoorf, Aschbach, Scholuenburg, and Sahl. MacMahon expecting promised reinforcements refrained from attacking, but on the next morning skirmishes took place between the outposts, and though neither army was ready the firing soon grew into a general engagement. The French fought well from 9 A.M. till 1 P.M., but neither side gained material advantage. Shortly after 1 o'clock the crown prince's whole army came up. By 3½ o'clock MacMahon was forced to abandon Froschweiler, his army fled to the mountains in disorder, and the Germans gained the battle with 6,000 prisoners, 2 eagles, 6 mitrailleuses, and 35 guns. About the same time the first and second German armies had united, crossed the Saar, occupied Saarbrück, gained a stubborn fight for possession of the heights of Spichern, and forced the French to retreat toward Metz. After his victory over MacMahon the crown prince pressed forward to join the first and second armies. The three bodies were united on the 11th. The first advanced to the neighborhood of Metz on the 14th, and by attacking the 3d French corps at Courcelles prevented a French retreat to the line of the Marne and gave Prince Frederick Charles time to arrange his command to cut off the French army at Metz under Marshal Bazaine from a junction with other forces. This engagement resulted in a French loss of 4,000 men and a German of 5,000, and the driving of the French to the walls of Metz. On the 18th the French were again defeated at Gravelotte and driven within the fortifications of Metz. The first and second German armies then began the siege of Metz, while the third marched against MacMahon, who massed his army at Sedan. The Germans began the battle of Sedan Sep. 1, and on the following day the French defeated, surrounded, and without means of further resistance, were forced to surrender with their emperor at their head. The French loss in killed, wounded, and prisoners was nearly 150,000 men. After Sedan the Germans advanced to the capital, entered Rheims on the 5th, approached Paris in a half circle, established their headquarters at Versailles, and besieged Paris with a force of 122,000 infantry, 24,000 cavalry, and 622 guns. The investment of the capital necessitated the occupation of a line 50 m. long, and began Sep. 19. Strasburg was surrendered to the Germans after a long and heroic defense Sep. 27-8, Toul on the 23d. Soissons Oct. 16, Schlettstadt Oct. 24, and Metz itself with its army of 173,000 men Oct. 27. These surrenders left, for the chief of operations of the Germans, the investment of Paris. During its progress some fighting occurred at Chatillon, Meudon, Plessis-Picquet, and Moulins de la Tour, the Germans erected strong works to resist the sallies of the French. Thiers begged the European courts to intervene in vain. Jules Favre sought to negotiate an armistice with Prince Bismarck without success, the Germans defeated the French at Orleans and occupied the city Dec. 4, Faidherbe was overwhelmingly defeated by Gen. von Golben in a fourth attempt to relieve Paris at St. Quentin, 1871, Jan. 19, the French made numerous sallies from their

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works about Paris, but though courageous were unsuccessful, and on Jan. 28 Jules Favre and Prince Bismarck arranged terms for the capitulation of the city by the convention of Versailles. An armistice, extended to Mar. 13, was provided in order to have the question of peace or war determined by a newly-elected national assembly, the Germans took possession of the fortifications of the city, and the besieged army were declared prisoners of war. The new assembly met at Bordeaux Feb. 12, Adolphe Thiers was elected pres. of the new republic on the 17th, and a special committee signed a preliminary treaty of peace at Versailles on the 24th. By its terms France ceded to Germany the greater party of the territory of Alsace and Lorraine, and agreed to pay a war indemnity of 5 milliards fr., one milliard in 1871, the remainder within three years. The treaty was confirmed by the assembly, and Napoleon and his dynasty deposed Mar. 1, the Germans made a triumphal entry into Paris on the 1st and 2nd, withdrew from the city Mar. 3, and from Versailles Mar. 12, and taking up their march for home left the capital city to undergo a siege more terrible than their own at the hands of the French Commune.

FRANÇOIS, St., *fröng-swá'*: town in the French W. Indies; in Guadeloupe, on the Grand Terre, the more easterly of the twin islands into which the colony is divided by an arm of the sea known as Salt River. Pop. abt. 6,600, of which about 5,600 were slaves till 1848, the epoch of emancipation under the French Republic.

Another town St. FRANÇOIS, in Martinique, has a good harbor on the e. coast. Pop. 5,966, of which 4,272 had been slaves.

FRANCOLIN, *frängk'o-lín* (*Fraucolinus*): genus of birds of the family *Tetraonidæ*, closely allied to partridges;



Gray Francolin (*Fraucolinus Ponticerianus*.)

natives of Europe, Asia, and Africa. One species only,

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the EUROPEAN F. (*F. vulgaris*), is found in the most southern parts of Europe.

FRANCOLITE, n. *frän'kó-lit* [from Wheal *Franco*; Gr. *lithos*, a stone]: variety of apatite.

FRANCONIA, *frän-kō'ně-á* (Ger. *Franken*): name applied first to districts on both sides of the Maine, originally peopled by colonies of Franks, under Thierry, eldest son of Clovis, who inherited the Germanic possessions at the death of Clovis 511. Under the Merovingian and Carolingian dynasties, this province acquired a degree of preponderance in the state, and had the privilege of electing king of the Germans within its own territories, and crowning the sovereign by the hands of its abp. (Mayence), primate of the empire. In 911, Conrad, Count or Duke of Franconia (there is some doubt which of these was then title of the ruler of the province) was raised to the throne; and a century later, after the ducal dignity had been recognized in F., the choice of the electors again fell upon the Franconian House, which, by its direct and collateral branches, gave kings and emperors to Germany from 1024 when Conrad II. began his reign, till 1250 when the indirect line of the Hohenstauffen family became extinct. During its connection with the crown, F. increased in extent and importance, while its great spiritual principalities of Mayence, Spire, Worms, and Würzburg acquired both wealth and political influence. In the following 200 years, the province underwent various modifications, and was subdivided into numerous territories, as those of the Rhenish County-palatine, Nassau, Katzenellenbogen, Hainau, the landgravate of Hesse, etc., until the name of F. was limited to the e. portions of the ancient duchy, which included Würzburg, Fulda, Bamberg, Nürnberg, Hohenlohe, etc. In 1512, Maximilian I. re-established the circle of F., which then embraced the sees of Bamberg, Würzburg, and Eichstädt, Baireuth and Anspach, and several counties and cities. With the dissolution of the empire, the name of F. disappeared from among the political divisions of Germany; but since 1837 it has been revived in the kingdom of Bavaria (q. v.), where those portions of the ancient Franconian province, which in modern times have been known as the circles of the Upper Maine, Rezat, and Lower Maine, are now designated Upper, Middle, and Lower Franconia.—*Upper F.* includes the n.e. portion of Bavaria. It is watered by numerous rivers, as the Maine, Raab, Saale, etc., and is intersected by the Fichtelgebirge and by the hilly ranges of the Böhmer-Franken, and Steiger-Wald. The valleys produce good crops and fruit. The dist. is rich in minerals. Cap., Baireuth. Pop. (1900) 608,116. *Middle F.*, which abuts upon Württemberg, is intersected by branches of the Franconian Jura chain, but has few rivers of importance besides the Pegnitz and Altmühl, which are connected by the great Ludwig Canal. It produces good wine, but is celebrated chiefly for its hop-gardens. Anspach and Nürnberg are the principal towns. Pop. (1900) 815,895. *Lower F.*; with Aschaffenburg, which occupies the n. w. part of Bavaria, is the richest and best cultivated of the

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Franconian circles, and is celebrated for the excellence of its wines, the Steiner and Leister. The district is noted for its mineral springs at Kissingen, Brückenau, Orb, and Wipfeld. Cap., Würzburg. Pop. (1900) 650,766—Small portions of F. were ceded to Prussia 1866. Pop. of the three F.'s (1900) 2,074,777.

FRANCONIA MOUNTAINS, *frân-kō'nē-a*: western group of the White Mountain range, Grafton co., N. H.; separated at varying distances from the group by Franconia Notch; and comprising the peaks of Mts. Lafayette (the Great Haystack, 5,290 ft. high), Liberty, Cherry Mountain, and Moosilauke (4,811 ft.), and Echo Lake, Eagle Cliff, Profile Rock, Profile Lake, Bald Mountain, the Basin, Flume, Pool, and Georgiana Falls. Both the e. and w. groups are famous pleasure resorts and contain considerable iron.

FRANC-TIREURS, *frâng tē-rèr*: bands of French soldiers that sprang into existence during the progress of the Franco-German war (1870-1). They did not form a part of the regular army, and at first their military organization was very imperfect; but this afterward improved. They exercised a species of guerilla warfare, attacking small detachments of the enemy, as also single travellers, baggage-trains, etc., their attacks being to often characterized by those savageries incident to this mode of warfare. They consisted mostly of the rural population; and at first, they were not recognized by the Germans as having any military standing, and when seized they were shot; but later, when they received a better organization, and co-operated with the regular French army, such recognition was accorded them.

FRANEKER, *frân'ek-ér*: handsome town of the Netherlands province of Friesland, on the canal between Harlingen and Leeuwarden. It was formerly the seat of a university founded 1585 by the Frisian states on the suggestion of Prince William Louis, Count of Nassau, which ranked among its professors the eminent names of Vitringa, Schultens, Hemsterhuis, Valckenaer, and others. The university was abolished by Napoleon 1811, and 1816 the institution was transformed into an athenæum, to which a physiological cabinet and botanic garden belong. There is here a remarkable Planetarium (q.v.), made 1774-81 by Eisinga. Pop. (1879) 7,222.

FRANGIBLE, a. *frân'jî-bl* [F. *frangible*; It. *frangibile*—from L. *frangĕrĕ*, to break: It. *frangere*]: that may be broken; easily broken; brittle. FRANGIBILITY, n. *-bîl'î-tî*, brittleness; in *geol.*, the degree of facility with which a rock yields to the hammer.

FRANGIPANE, n. *frân'jî-pân*, or FRANGIPANI, n. *-pâ'nî* [after the first maker, the Marquis *Frangipani* of France, under Louis XIII.]: a valued perfume made from many ingredients, the most lasting known; a kind of pastry; a pudding of broken bread, etc. [L. *frango*, I break; *pânĕm*, bread].

FRANGIPANI, *frân-jĕ-pâ'nē*: illustrious and powerful Roman House, which traces its origin to the 7th c., and attained the summit of its glory in the 11th and 12th c. In

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the early annals of Rome, several members of this family occupied important offices, and seem to have been public leaders. In 987, Crescenzo F. successfully vindicated the prerogatives of the Roman people against the encroachments of Pope John XV. The rivalry of the F. House with that of the Pietro Leoni, not only occasioned repeated civil wars in the state, but likewise several schisms in the church. The lustre of their race was finally outshone by the two great patrician families, Colonna and Orsini, whose magnificence, power, and pretension far exceeded those of the greatest citizens of Rome. Two of the last of the F. who were notable are Giovanni, who captured Conradin of Hohenstaufen, and delivered him, 1268, to his sanguinary enemies; and Latino, Grand Inquisitor and Cardinal and Bishop of Ostia and Velletri. The origin of the name Frangipani is attributed to the family's benevolent distribution of bread in famine.—The Croatian family of the same name claim descent from the great original Roman House.

FRANGULIN, n. *fräng'gū-līn* [L. *frangere*, to break, in *mid. L.*, to bring under cultivation]: a yellow crystalline body found in the bark of a plant, the *Rhamnus frangula*. **FRANGULIC**, a. *fräng-gū'lik*, denoting an acid substance from it.

FRANION, n. *frän'yūn* [perhaps from F. *franc*, free, in a bad sense, as we have *free-thinker*, an atheist (see **FRANK** 2)]: in *OE.*, a free liver; a boon companion; a paramour.

FRANK, a. *frängk* [F. *franc*, open, free—from *mid. L. francus*, free (see **FRANCHISE**)]: open; candid; ingenuous; generous; in *OE.*, without payment; free: V. to exempt, as a letter from the charge of postage; to exempt from payment. **FRANK'ING**, imp.: N. the indorsement which formerly exempted a letter from postage. **FRANKED**, pp. *frängkt*. **FRANK'LY**, ad. *lī*, in a frank manner; without reserve; freely; readily. **FRANK'NESS**, n. plainness of speech; candor.—**SYN.** of 'frank, a.': artless; plain; sincere; undisguised; unreserved; hearty; liberal; ready; free; unrestrained; willing; unhesitating.

FRANK, n. *frängk* [OF. *franc*, a pig-sty]: in *OE.*, an inclosure where pigs are fattened; a pig-sty: V. to shut up in a pig's sty; to feed high; to cram. **FRANKED**, pp. *frängkt*, put within an inclosure for fattening.

FRANK, JACOB JOSEPH: see **FRANKISTS**.

FRANK, POSTAL: exemption from postage, of letters and other mail matter. This privilege of British peers, members of the house of commons, and many officials, was claimed by the commons, 1660, at the legal establishment of the post-office (q.v.), and was confirmed to that house by statute under George III. The whole system developed into enormous abuses; and on the introduction of the uniform penny-postage on all inland letters, 1840, the system of franking was abolished in Britain. In the United States, the first privilege of the F. was granted by congress, 1776, Jan., to all private soldiers in service for letters from and to themselves. Special, modifying, defining, and

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abolishing acts were adopted 1782, 1791, 1808, 1810-14, 1820, 1845, 1851, 1863, 1873, 1874, 1875, 1877, 1881, 1882, and 1883. The act of 1873, Jan. 31, abolished the privilege and compelled all persons previously authorized to use the F. P. to pay regular rates of postage; that of 1874 authorized the transmission of public documents and the *Congressional Record* at a reduced rate, when certified by a member of either house of congress or the head of a dept.; that of 1875, Mar. 3, restored the privilege to members of the existing congress for documents, the *Record*, seeds, and reports of the agricultural bureau; that of 1877, Feb. 27, provided special stamps for official letters from the executive depts.; that of 1877, Mar. 3, abolished these stamps, and substituted penalty envelopes for the depts., and authorized the free transmission of public documents by the members and clerks of both houses of congress; and that of 1879, Mar. 3, extended the use of 'penalty envelopes' to all officers of the govt., except pension-agents, and to the Smithsonian Institution. An official communication requiring answer is now accompanied by a penalty envelope, which can be used only for the special purpose under a penalty of \$300. Congress by special acts has granted the franking privilege to the widows of deceased presidents.

FRANK-ALMOIGNE, n. *frāngk'āl-mōyn'* [F. *franc*, free; Norm. F. *almoigne*, alms; Lat. *libera eleemosyna*, free alms]: ancient land tenure held 'by the services of religion'—that is, praying for the souls of the donors and their heirs. Its basis was a gift of lands to those consecrated to the service of God. By the ancient common law of England, a man could not alien lands which came to him by descent without consent of his heir, but he might give a part to God in free alms. It was an old Saxon tenure, and continued under the Norman revolution, through the great respect that was shown to religion and religious men. This is the tenure by which almost all the ancient monasteries and religious houses in Britain held their lands, and by which the parochial clergy and very many ecclesiastical foundations hold them at this day. The condition on which lands in F. were held was, that masses and divine services should be said for the grantor and his heirs, but no particular service was specified. At the Reformation, the nature of the services was changed, but the tenure was allowed to continue. A tenant in F. did no fealty to his overlord, and in the event of failure to perform the service, the latter was not entitled to distrain, but might complain to the ordinary or visitor. In this respect, this tenure differed from tenure by divine service, i. e., where lands were given on condition of performing a specified service, as saying a mass on a particular day, or distributing certain alms. In this case, the tenant was bound to render fealty, and the lord was entitled to distrain on failure to perform the service. But lands held in F. were subject to the *trinoda necessitas*, of repairing highways, building castles, and repelling invasions. For Scotch usage, see MORTIFICATION.

FRANKENBERG, *frānk'ēn-bērēh*: flourishing manufact-

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uring town of the kingdom of Saxony, on an affluent of the Mulde, 32 m. s.w. of Dresden. It has manufactures of cottons, woolens, silk-stuffs; also dye-works, and cigar manufactories. In addition to the other elementary and advanced educational establishments, F. has a trade school and an agricultural seminary, Pop. (1890) 11,369.

FRANKENHAUSEN, *fránk'én-how-zén*: small town of Germany, in Schwarzburg Rudolstadt, on the Wipper, 27 m. n.n.w. of Weimar. It has a palace, a high school, and a seminary for teachers. Here are very productive salt springs, a large sugar-refinery, with manufactories of cigars and articles in mother-of pearl. In the neighborhood are anthracite mines. Pop. (1890) 5,944. F. figures in history as the scene of a battle between the rebellious peasants under Thomas Münzer, 1525, May 15, and the Saxon, Brunswick, and Hessian troops, in which the peasants were defeated.

FRANKENIA, n. *fräng-kě'nĩ-a* [named from John *Franken*, Swedish botanist, prof. of medicine at Upsal, d. 1661]: sea-heath, typical genus of *Frankeniaceæ*, an order of hypogynous exogens. About 24 species are known, chiefly from the n. of Africa and the s. of Europe, and are mucilaginous and slightly aromatic.

FRANKENIADS, n. *fräng-kě'n'ĩ-ads*: the English name given by Lindley to the order *Frankeniaceæ*.

FRANKENSTEIN, *fránk'én-stín*: small but active town of Prussia, province of Silesia, on a height on the left bank of the Pause, 37 m. s.s.e. of Breslau. Six m. s.w. of F. is the mountain fortress of Silberberg (still existing, but not maintained as a fortress since 1860), the defenses, bastions, and casemates of which are almost entirely hewn out of the solid rock. These works were constructed by Frederick the Great, to command the passage from Bohemia. The people are engaged in the manufacture of broadcloth, linen, aquafortis, strawplait, saltpetre, etc. Pop. (1890) 8,127.

FRANKENTHAL, *fránk'én-tál*: prosperous manufacturing town of Germany, in the Bavarian Palatinate; on the Isenach, 16 m. n.n.w. of Spire. From the town, a canal between 50 and 60 ft. broad extends e. to the Rhine, three miles. F. has important cloth manufactures, cotton and linen weaving, and manufactures of gold and silver wire, and of needles, files, and tobacco. Pop. (1890) 12,901.

FRANKFORT, *fránk'fort*: city, cap. of Ky., and of Franklin co.; on both sides the Ky. river; on the Louisville Cincinnati and Lexington railroad; 25 m. w.n.w. of Lexington, 45 m. e. of Louisville, 70 m. s. by w. of Cincinnati. It is beautifully situated in a cluster of hills of Silurian limestone, 62 m. above the mouth of the river, which is here 750 ft. wide and crossed by two bridges. It contains a marble state-house, state prison, court-house, state institution for the training of feeble-minded children, state library, Ky. Milit. Institute, large and handsome public school building, high school, young ladies' seminary, 7 churches, 3 state banks (cap. \$1,268,800), and several daily

FRANKFURT-ON-THE-MAIN.

and weekly newspapers. The industries comprise important lumber interests (cherry, walnut, ash, oak, poplar), 2 flouring mills, 5 distilleries, 6 saw mills, cotton mill, and pottery. The town was laid out 1787, made seat of govt. 1792, and held by Confederates a month, 1862. Pop. (1870) 5,396; (1880) 6,958; (1890) 7,892; (1900) 9,487.

FRANKFORT-BLACK: fine black pigment used in copper-plate engraving. It is said to be made by burning, in the manner of ivory-black, the lees of wine from which the tartar has been washed. Fine Frankfort-black, though almost confined to copper-plate printing, is one of the best black pigments, being of a fine neutral color, next in intensity to lamp-black and more powerful than that of ivory.

FRANKFURT-ON-THE-MAIN, *fránk'fúrt-on-the-mín* (Ger. *Frankfurt am Main*): city in the Prussian province of Hessen-Nassau; on the right bank of the Main, lat 50° 6' n., and long. 8° 41' e.; most ancient, and till 1866 foremost, of the four free cities of the German Confederation, and the seat of the Diet. The city lies in a wide and fertile valley at the mouth of the Main, and is encircled by a belt of villas, gardens, vineyards, and orchards. In commerce and wealth, F. is one of the most important cities of Germany. Pop. (1875) 103,315, of whom more than 7,000 were Jews; pop. (1890) 179,985; (1900) 288,989.

F. is the centre from which radiate public roads and railways to every part of Germany; while its site on the banks of the Main, 20 m. from its confluence with the Rhine, affording direct water-communication with the German Ocean, secures to it great advantages for commerce. Its central position has pointed it out from early ages as a suitable place for national meetings, and in 794 Charlemagne convoked here a council of 300 bishops to condemn the decree of the second council of Nicæa (7 years before) sanctioning the worship of images (see CAROLINE BOOKS). In 843, F. was made cap. of the e. Frankish empire, and continued so till 889, when Arnulf transferred the honor to Ratisbon; in 1257, F. was raised to the dignity of a free city; and in 1356, Charles IV. confirmed by the famous 'Golden Bull' the right which it had had since the days of Frederick Barbarossa, of being the place for the election of emperors of Germany. The Guildhall, or *Roemer*, contains the Waalzimmer, or Hall of Election, in which the Electors (q.v.) met to deliberate on the nomination of the emperors; and the *Kaisersaal*, or Imperial Hall, in which the newly elected monarch held his public dinner, at which he was waited upon by the counts and high officers of the empire, who held their respective domains and offices in right of their performing various acts of service on that occasion. Round this hall are ranged in niches the portraits of the emperors from Conrad to Leopold II. The Golden Bull is preserved among the archives. The ancient cathedral, St. Bartholomew's contains the chapel in which the electors accepted the emperor after he had been anointed at the high-altar. F. still contains many old and

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narrow streets with high-gabled projecting houses, but its ancient walls and ramparts have been converted into pleasure-walks, and there are now broad quays, and wide handsome streets in the modernized parts of the city. The gates of the famous *Juden-gasse*, which were closed at night to prevent the ingress of the Jewish inhabitants, were razed at the time of the French occupation 1806; and the street is now more than half demolished, almost the whole of the w. side having been pulled down. F. is connected with its suburb, Sachsenhausen, which lies on the left bank of the Main, by three bridges (one dating from 1342, another finished 1878), besides the railway bridge and a wrought-iron suspension bridge for foot-passengers. There are fountains in several of the squares, one of which is adorned with a fine statue of Goethe, who was born at F., and another with a group commemorative of the invention of printing. F. has several good public libraries, museums, and galleries, and many charitable institutions. It derives great wealth from its banking transactions; the aggregate capital of its bankers, among whom the name Rothschild has long stood foremost, is said to be about 100 million dollars; and the annual transactions in bills of exchange about 60 million dollars. Its manufacturing industry has greatly extended since the annexation to Prussia; to the former manufactures of snuff, tobacco, jewelry, printers' black, wax-cloths, and carpets, have been added type-founding, chemical works, and the manufacture of sewing-machines on a large scale. As a free city, F. possessed a small territory of about 39 sq. m. outside its precincts, and was governed by 2 burgomasters (elected annually), 4 syndics, a civic committee of 21 members, and a legislative chamber of 57 members; the highest court of appeal was the supreme tribunal at Lübeck. The Constituent Assembly elected 1848 to frame a constitution for Germany, held its sittings at F. At the outbreak of the Austro-Prussian war 1866, F. chose the side opposed to Prussia: July 16, Gen. von Falckenstein entered the city; a fine of 31 million florins was imposed; and on Oct. 18 F. was formally incorporated with the Prussian state. It was in F. at the Swan Hotel, that Bismarck and Jules Favre signed the treaty of peace between Germany and France, 1871, May 10.

FRANKFURT-ON-THE-ODER, *fránk'fúrt-on-the-ô'dér*: capital of an extensive Prussian circle of the same name in the province of Brandenburg; on the railway between Berlin and Breslau, and about 50 m. e. of Berlin; lat. 52° 22' n. and long. 14° 33' e. It is a handsome, well-built town, and has three suburbs, one of which, on the right bank of the Oder, is connected with the remainder of the town by a wooden bridge. Of the six Prot. churches, St. Mary's, founded in the 13th c., is most noticeable, for its large organ, richly gilt wood-carvings, and fine stained windows. The university, founded 1506, was incorporated 1811 with that of Breslau, but F. still has its distinct gymnasium, with its branch schools. Three great fairs, annually held at F., are still attended, as of old, by many Poles and Silesians, but sales are less brisk than in former times. F. has manu-

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factures of ironware, porcelain, and pottery, sugar, felt, bone-dust, liqueurs, chocolate, paper, leather, silk, and wool-stuffs. Its situation, on a navigable river, connected by canals with the Vistula and the Elbe, affords great commercial and social advantages, which have given it importance from a very early period. It was a flourishing member of the Hanseatic League, and during the middle ages suffered frequently at the hands of marauding enemies. It was besieged 1430 by the Hussites, 1450 by the Poles, and 1477 by the Duke of Sagan. In the Thirty Years' War, it was frequently taken by both parties, and at the beginning of the present c. it suffered severely at the hands of the French. F. is the seat of the administrative govt., judicial tribunal, council of nobility, and boards of taxation for its circle. The village of Kunersdorf, 4½ m. from F., was the scene of a great battle, 1759, Aug. 12, between Frederick the Great and the Russo-Austrian forces, in which the former was compelled to retreat, with great loss. Pop. in 1880, 51,147; (1890) 55,738; (1900) 61,852.

FRANKINCENSE, n. *frāngk'īn-sēns* [OF. *franc-encens*, pure incense: *frank*, free, and *incense*], (*thus*): name applied to various gum-resins which diffuse a strong fragrance in burning, and are on that account used in certain religious services. There is reason to believe that the frankincense of the Jews, also of the ancient Greeks and Romans, was chiefly or entirely the substance now known as *Olibanum* (q.v.), product of an Indian tree, *Boswellia serrata* or *thurifera*: see BOSWELLIA. It was formerly supposed to have been obtained from the *Juniperus Lycia*, which is now believed not to yield any such product, and is a native of the s. of Europe, while the prized frankincense of the ancients was brought from the East.—Several trees, however, of different nat. orders, yield substances used as F. instead of olibanum, in different parts of the world, as several species of *Iceia* and of *Croton* in America; and the silver-fir (see FIR) in Europe, the resinous product of which is the COMMON FRANKINCENSE of the pharmacopœias, though, in the shops, concrete American turpentine is very often sold under this name. It is used in the composition of stimulating plasters, etc. *Burgundy pitch* is made from it. It is a spontaneous exudation from the tree, hardening by exposure to the air, and generally of a whitish or pinkish color, with a rather agreeable odor and a balsamic taste.

FRANKISTS, *frānk'ists*: Jewish sect, founded by Jacob Joseph Frank (1712–91; b. Poland), known also as Zoharites from their sacred book. After travelling some time in the East, Frank returned to Poland, settled in Podolia, became noted as a Cabalist, and formed a sect, comprising some rabbis, of persons learned in the so-called mystical science. He claimed to have received his doctrines from Sabbathai Scir, and published them in a book regarded by his adherents as inspired of God. He was arrested through the jealousy of the rabbis, released by the Rom. Cath. clergy, and given freedom to preach openly, by the king. The

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subsequent severity of his followers upon adherents of other communions was checked by the papal nuncio at Warsaw; many of the sect fled to Moldavia, while others, including Frank, nominally professed Christianity. Frank was baptized and soon afterward imprisoned on charges of heresy. During the Russian invasion, he was released, and spent the remainder of his life in Vienna, Brunn, and Offenbach, living sumptuously on money collected from his followers.

FRANKLANDIA, n. *frängk-län'di-a* [named after Sir Thomas *Frankland*, careful student of marine algæ and of botany generally]: typical genus of *Franklandiæ*, a family of *Proteaceæ*, tribe *Nucamentaceæ*.

FRANKLIN, *frängk'lîn*: town in Norfolk co., Mass.; on the New York and New England railroad; 20 m. n. of Providence, 28 m. s.w. of Boston. It has 6 churches, Dean Acad., public library, one national bank (cap. \$200,000), one savings bank, and manufactories of straw, felt, and shoddy goods. F. is noted as the home and field of the life-long labor of Nathanael Emmons, D.D. (q.v.), one of the famous theologians of New England. Pop. tp. (1885) 3,983; (1890) 4,831; (1900) 5,017.

FRANK'LIN: city, cap. of Venango co., Penn.; on the Alleghany river, at mouth of French creek; on branch of the Atlantic and Great Western railroad; 9 m. s.w. of Oil City, 28 m. s.e. of Meadville, 65 m. n. of Pittsburg. It contains a co. court-house, 10 churches, several hotels, one national bank (cap. \$100,000), one state bank (cap. \$50,000), 3 private banks, 4 oil-refineries, 3 machine shops, 2 flouring-mills, planing-mills, and carriage and brush factories. It occupies the site of Fort Venango, built by the French 1753, and was incorporated 1868. Pop. (1870) 3,908; (1880) 5,010; (1890) 6,221; (1900) 7,317.

FRANKLIN, n. *frängk'lîn* [OF. *frankeleyn*—from mid. L. *franchilānus*—from *francus*, free: F. *franc*, free: prov. F. *frank*, spacious, wide]: freeman and substantial householder; the English freeholder of former times, who held his lands of the crown, free (frank) from any feudal servitude to a subject-superior. Chaucer's *Franklin's Tale*, and still more his description of the F. in the prologue to his immortal Pilgrimage, have rendered this character classical. In the whole circle of English literature there is probably no more perfect picture of the person, habits, and surroundings of a jovial old country gentleman. His beard was white as a daisy, his complexion sanguine, he loved a 'sop in wine,' and woe to his cook if his sauce were not poignant and sharp; in a word, 'he was Epicurus' own son.' But the F.'s luxuries were not for his own enjoyment alone, for 'a householder, and that a great, was he.' His table stood 'in his hall alway,' 'ready covered all the longe day;' and

Withouten baked meat never was his house;
Of fish and flesh, and that so plenteous,
It snowed in his house of meat and drink.

Nor was it only in dispensing good cheer that the F. fulfilled the functions of the country gentleman of his day.

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At sessions, he was 'lord and sire,' and often he had been 'knight of the shire.' He had been sheriff too, and a countour and vavasour; though what these latter offices were, is a subject of controversy among the commentators. 'The dress of the F., according to the Duke of Sutherland's ms., was a surcoat of red, lined with blue, with bars or stripes of fringe or lace over it. He wore a small blue hat, turned up, and black boots.' (Saunders, *Cabinet Pictures of English Life*, p. 204.) Chaucer adds to his attire a knife or dagger called an 'anelace,' and a 'gipciere' or silk purse, 'white as morrow [morning] milk,' at his girdle. Mr. Saunders mentions (*ut sup.*) that, in the Metrical Chronicle of Robert de Brune, the F. of an earlier period (13th c.) is ranked immediately after earls, barons, and lords, and was evidently a person of great consideration. This was very much his position in Chaucer's time; but later he seems to have lost dignity, and we find him in much lower company in Shakspeare's day. In *The Winter's Tale*, the clown is made to say (Act v. scene 2):

Not swear it, now I am a gentleman?
Let boors and franklins say it, I'll swear it.

From other passages, it would seem that his position had come to correspond to that of the well-to-do yeoman. In 1 Henry IV., Act ii. scene 1, we hear of a F. 'in the wold of Kent hath brought three hundred marks with him in gold;' and *Cymbeline* says (Act iii. scene 2), 'Provide me presently a riding suit, no costlier than is fit a franklin's housewife.' There seems no reason to think, however, that Dr. Johnson's remark that F. is 'not improperly Englished a gentleman servant,' is warranted by his position at any period; and it certainly is not by the passage which he quotes from the *Faëry Queen*:

A spacious court they see. etc..
Where them does meet a franklin fair and free.

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FRANKLIN, BENJAMIN, LL.D., F.R.S.: 1706, Jan. 17--1790, Apr. 17; b. Boston: philosopher, statesman, scientist. He was the 15th of 17 children, was placed at school when 8 years old, and in his father's tallow chandlery when 10, and to prevent his running away to sea, was apprenticed to the printer's trade under his brother James, who conducted the *New England Courant*. He read with avidity every book that he could obtain, wrote and published in his brother's paper a number of ballads, and studied an odd volume of *The Spectator* with intense earnestness, making it the model of his style of composition. He mastered arithmetic without aid and began studying navigation when 16 years old, and about the same time read *Locke on the Understanding*, the *Port Royal Logic*, Shaftesbury, Collins, and Tyron's work on a vegetable diet, and began publishing thoughtful articles anonymously in the *Courant*, which soon attracted more than local attention. The discovery of their authorship led to a quarrel between the brothers, in the midst of which James was imprisoned for political utterances in the *Courant*, and its publication by him forbidden. Benjamin then continued the paper several months as nominal printer and publisher, but after another quarrel broke his indentures in 1723 and went first to New York and thence to Philadelphia, where he found employment as a journeyman printer. He resumed writing political articles, boarded with the father of the young woman who had ridiculed his appearance as she happened to see him passing the house eating a roll on the day of his arrival in the city; and attracting the attention of Sir William Keith, gov. of Penn., was promised by him the office of public printer, after he should visit London and purchase a printing outfit. On the strength of this promise he engaged himself to Miss Read, the young woman above referred to, went to London 1724, discovered that Gov. Keith had grossly deceived him, and being friendless and moneyless took service with a printer and spent 18 months in London. He returned to Philadelphia 1726, became clerk in the dry-goods store of Mr. Denham who had engaged him in London, married Miss Read 1730, and with a monied friend established, the *Pennsylvania Gazette*. Within a short time he attained wide fame for intelligence, industry, and efforts to promote all worthy public and educational measures. He invented a copper-plate press and engraved and printed a large amount of currency for the prov. of N. J.; established the Philadelphia library 1742, and the American Philosophical Soc. and the Univ. of Penn. 1744; invented an economical stove bearing his name; carried on a series of experiments to determine the nature of lightning; and (1752), by means of a kite with a key strung on its cord demonstrated that lightning was merely a discharge of electricity, and that the electricity of the scientific apparatus and the lightning of the clouds were identical. His kite had been provided with a pointed rod of iron and a silk string attached to a longer one of hemp. When the thunder cloud passed over the soaring kite he received a spark on his knuckles from

the iron key fastened to the silk string. The success of this experiment led him to the belief that a pointed iron rod attached to the highest part of a building and extending thence into the ground would preserve the building from the lightning's stroke and lead the electric current beyond harm's point and the application of this belief of his discovery originated the lightning-rod. This scientific discovery secured for him membership in the Royal Soc. and the Copley gold medal 1753. With all these occupations he managed his newspaper with signal ability, and found time to establish an almanac for the diffusion of useful information among the people, which he at first (1732) published under the name of Richard Saunders and for 25 years thereafter under the title of *Poor Richard's Almanac*. In 1733 when 27 years old he began studying the French, Italian, Spanish, and Latin languages, 1736 was elected clerk of the Penn assembly, 1737 was appointed post-master of Philadelphia, 1750 was elected member of the assembly, subsequently was appointed commissioner to negotiate a treaty with Indians, and 1753 became deputy post-master-gen. for all the colonies. In the latter office he created a system by which the postal business of the country was carried on with a profit to the govt. for the first time. In 1754, as a deputy to the general congress held in Albany to devise means of defense against the French, he proposed a plan of union for the colonies which was unanimously adopted by the convention, but subsequently rejected by the British govt. as too democratic and by all the colonies as not sufficiently so. He then co-operated with Josiah Quincy in procuring a loan in Philadelphia for New England, and having vainly endeavored to dissuade Gen. Braddock from his proposed expedition, was afterward the mainstay of his army, and pledged his own property to the farmers for payment for horses, wagons, and provisions, furnished Braddock at F.'s personal solicitation. The lack of popular support of Braddock's disastrous campaign arose from a dispute between the royal gov. and the assembly of Penn. concerning taxation of proprietary estates, the gov. insisting that such estates should be free of taxation, the latter that they should bear their proportionate share of the public expense. F. warmly advocated the assembly's position, and 1757 was sent by it to England, to argue its cause before the privy council. He applied himself directly to his public duty, and three years afterward the council decided in favor of the assembly. His visit was extended to five years, he was honored by the most eminent people of the country, he made further experiments in electricity and invented a musical instrument, and Oxford and Edinburgh Universities conferred on him their highest degrees. On his return to Philadelphia the Penn. assembly unanimously voted him its thanks. Two years later (1764) he was again sent to England as agent for Penn. to present a remonstrance against Grenville's proposed stamp-act for defraying part of the expenses of the late war, and to prevent if possible the passage of the act. Mass., Md., and Ga., also appointed

him their agent in London. Despite his efforts the act was passed 1765, but the succeeding ministry reconsidered it, and, after an argument by F. before the house of commons, it was repealed. In the following year a bill to tax American imports and apply the proceeds to the maintenance of a civil list in each colony was carried. This act led to serious commotion in Boston, and while it was in progress F. received from a member of the British parliament, a number of letters written to Thomas Whately in London by Gov. Hutchinson and Lieut. Gov. Oliver of Mass., which in substance urged coercive measures against the colonies. F. sent copies of the letters to Speaker Cushing, of the Mass. assembly, who showed them to several persons, and soon the people of Mass. were convinced that the gov. and lieut.-gov were plotting against popular liberties. The assembly petitioned the king for the removal of the inculpable officials, and when F. presented the petition to the privy council he was grossly insulted. Almost the entire session was taken up in abusing F., and near its close the petition was rejected as scandalous. The following day F. was removed from the office of postmaster-gen. He remained abroad till 1775, exerting his influence to prevent a rupture between the colonies and the mother country, though subject to many spiteful annoyances by the king's party after the rejection of the Mass. petition, and spending considerable time among the learned men of France, Scotland, Ireland, and Wales. Realizing in his own mind that the colonial troubles could not be settled without resort to arms, distressed at the death of his wife, and grieved that his son WILLIAM F. (q.v.), who had been appointed royal gov. of N. J. should turn against him for the royal favor, he returned to Philadelphia 1775, May 5, to find that a bloody conflict had occurred 16 days previously in the streets of Lexington, Mass. The day following his arrival the Penn. assembly unanimously elected him a delegate to the second continental congress then about to assemble, and he entered upon his new duties a stanch adherent of the war party. He was appointed a member of the committees of safety and foreign correspondence, urged a declaration of absolute independence of Great Britain, assisted Jefferson in drafting the immortal document and signed it with eagerness. Soon as the Declaration was signed. Silas Deane and Arthur Lee were sent to France to negotiate an alliance, and 1776, Dec. 21, F. reached Paris charged with the task of securing the active aid and co-operation of the French govt. in the war. Though unofficially received at first, he induced the ministry to guarantee a loan of 2,000,000 livres a year in quarterly payments, and to permit arms and ammunition to be sent from France and privateers to be fitted out and to take prizes into French ports. This aid was promptly given through 1777, but open sympathy was withheld for political reasons. The surrender of Gen. Burgoyne made a radical change in the condition of affairs in America, England, and France. The Americans were greatly stimulated, the English began to show alarm and sent

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messengers to F. to sound him on the possibilities of a compromise and ascertain the nature of the concessions which he might deem likely of acceptance; and the French realizing from the defeat of Burgoyne that the American people could render France large political and military advantages in the event of a war between France and England, expressed a willingness to treat with F. for a formal alliance. On 1778, Feb. 6, fresh negotiations by F. resulted in the signing of the treaty of Paris, an act of the highest importance to the cause of American independence. The following month Lord North's ministry was forced to retire, and was succeeded by one in which F.'s friend Lord Shelburne held the portfolio of sec. of state for home and the colonies. F. wrote Shelburne privately in favor of peace, and the latter consulting with the cabinet sent an agent to confer informally with F. F. demanded the cession of Canada and Nova Scotia as a means of securing durable peace, to which Shelburne emphatically demurred, while claiming that compensation should be made the British for surrendering New York and other seaports still held by royal troops. The negotiations thus inaugurated privately by F. and Lord Shelburne were subsequently taken up by John Jay, John Adams, and Henry Laurens, acting as commissioners on the part of the United States, and with F.'s shrewd diplomacy and skill in handling men were carried to a completion that, by the definitive treaty of peace, 1783, Sep. 3, secured far more advantages to the United States than could have been deemed possible in view of the peculiar attitude of England, France, and Spain with reference to American territory, and their own political intrigues. Before leaving Paris F. negotiated treaties also with Sweden and Prussia, the latter of which Washington characterized as the most liberal that had ever been made between independent powers, and as marking a new era in international morality. F.'s diplomatic achievements in Paris were neatly touched by Lacretelle thus: 'His virtues and renown negotiated for him; and before the second year of his mission had expired, no one conceived it possible to refuse fleets and armies to the countrymen of Franklin.' He returned to Philadelphia 1785, Sep. 14, was elected pres. of Penn. the next month, was re-elected 1786 and 87, and in the latter year was chosen a delegate to the federal constitutional convention. Two months before his death he performed his last public duty, signing a petition to congress, for the emancipation of slaves and the abolition of the slave trade, as pres. of the Abolition Soc. F. was 5 ft. 10 in. in height, well formed, with light complexion and gray eyes. His attire was neat and unpretending, his manner intensely earnest, his deportment dignified yet not stiff. His remains were buried beside those of his wife in Christ churchyard on Fifth and Arch streets, Philadelphia, where both remain under plain marble slabs inscribed 'Benjamin and Deborah Franklin.'

FRANKLIN, JANE, Lady: second wife of Sir John F. to whom she was married, 1826, Nov. (d. 1875); daughter

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of John Griffen, of London. To her unwearied energy, devotion, and hopefulness, we are indebted for the knowledge of the fate of her gallant husband. In 1848, when, owing to the long absence of news about the expedition of the *Erebus* and *Terror*, fears began to be entertained about its safety, Lady F. offered large rewards to any persons who should discover and relieve the missing voyagers, or who would make exertions with that end in view. From that time until 1857, when she fitted out the *Fox*, under M'Clintock, whose discoveries set all doubts about the fate of her husband's expedition at rest, Lady F. never rested in her efforts to incite by voice, pen, and purse, her own countrymen and Americans, to search for the missing ships. Till her last illness her interest in Arctic exploration never flagged.

FRANKLIN, Sir JOHN, Rear-Admiral in the British navy: 1786, Apr. 16—1847, June 11; b. Spilsby, Lincolnshire; youngest son of a respectable yeoman, descended from a long line of freeholders. F. received the rudiments of education at St. Ives; afterward he spent two years at the grammar school of Louth. It is stated that he was intended for the priesthood, but his decided predilection for the sea, led his father to procure him, 1800, a midshipman's post on the *Polyphemus* line-of-battle ship. In the following year, F.'s ship led the van in the desperate battle of Copenhagen. Two months afterward he was removed to the *Investigator*, then fitting out under command of Capt. Flinders, for discovery and survey of the Australian coast. In this expedition, F. learned the great importance of the natural sciences. On his return to England, F. was appointed to the *Bellerophon*, in which he acted as signal midshipman in the battle of Trafalgar (1805). He subsequently served in the *Bedford* on various stations, and was in the attack on New Orleans 1814. In 1819, F. was despatched by government to Hudson's Bay, with orders to make his way thence to the Arctic Sea, and survey as much of the coast as possible. In this expedition, which brought great gain to science, and lasted about three years and a half, F. travelled 5,550 m. under circumstances of great hardship and privation, to which more than half his companions succumbed. On his return, 1822, F. was made post-capt. and elected a fellow of the Royal Society. In 1825, he co-operated (overland) with the sea-expeditions of Captains Parry and Beechey, and surveyed the N. American coast from the mouth of the Coppermine westward to about Point Beechey. F.'s discoveries now extended over 44 degrees of longitude, or more than a third of the distance between Baffin's Bay and Behring's Strait. For these valuable explorations, in which he was engaged until 1827, he received the knighthood; the Univ. of Oxford gave him the degree D.C.L., and the French Geographical Soc. awarded him their gold medal, and later he was elected corresponding member of the Institute of France. F. next took active part in the Greek war of liberation. In 1836, he was appointed gov. of Van Diemen's Land, where his wise and moderate conduct gained warm approbation, and the colo-

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nists established a college and a philosophical soc. in his honor. Many years afterward they testified their grateful remembrance by subscribing £1,600 toward an expedition for his rescue. In 1845, May, F., now near his 60th year, but with physical and mental powers undiminished started with the *Erebus* and *Terror* on his last and ill-fated expedition to discover the Northwest Passage. The vessels were seen last in July of the same year. In the course of 11 years more than 20 separate expeditions, at the cost of about a million sterling, were sent out to look for the missing crews; and the discoveries of these expeditions added more to our knowledge of the arctic regions than all previous explorations had done: see NORTHWEST PASSAGE. It was not until 1859 that the fate of F. was ascertained by the commander of a little vessel fitted out by Lady Franklin, after hope had been declared hopeless by all else. It then appeared that F. had died nearly 12 years previously, fortunately spared from witnessing the awful sufferings of his men. F. was one of the boldest and most persevering explorers, and from the work ascertained to have been done before the collapse of the expedition, is now regarded as the discoverer of the Northwest Passage. Additional light was thrown on the fate of his crews by a memorable expedition on sledges under Lieut. Schwatka, U.S.N., 1879-80.

FRANKLIN, WILLIAM: 1729-1813, Nov. 17: illegitimate son of Benjamin F. by an unknown mother; b Philadelphia: last royal gov. of N. J. After his first year he was brought up by his father, became a capt. in the Penn. troops during the French war 1744-48, was comptroller of the gen. postoffice and part of the time clerk of the provincial assembly 1754-56, went to England with his father 1757, was admitted to the bar in London 1758, and appointed gov. of N. J. 1762. He turned from whig to tory after his appointment, was a strong royalist during the revolutionary war, was placed under guard and declared an enemy to his country 1776, Jan., broke his parole not to leave the province, and issued a proclamation as gov., was arrested by order of the provincial congress of N. J., and kept under strict guard at Burlington, and at E. Windsor, Conn., till his exchange 1778, Nov., and then lived in New York till 1782, Aug., when he returned to England and was pensioned. His course was a great grief to his father.

FRANKLIN, WILLIAM BUEL: U. S. army officer: b. York, Penn., 1823, Feb. 27. He graduated at the U. S. Milit. Acad. 1843, entered the corps of topographical engineers, was on the staffs of Gens. Wool and Taylor in the Mexican war, was acting asst. prof. of natural and experimental philosophy at West Point 1848-52, lighthouse inspector and engineer 1853-57, eng. sec. lighthouse board 1857-59, eng. in charge of Capitol at Washington 1859-61, appointed col. 12th U. S. inf. and brig gen. U. S. vols. 1861, May, commanded a brigade at Bull Run 1861, July, and a div. before Washington till 1862, Mar.; organized and commanded the 6th corps 1862, May; commanded at battles of West Point, Golding's Farm, White Oak Swamp;

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was promoted maj.gen. 1862, July 4, assigned to command left grand div. army of the Potomac 1862, Nov.; commanded left wing at Fredericksburg 1862, Dec. 12, 13; was on waiting orders six months; assigned to command 19th army corps 1863, Aug.; commanded expedition against Sabine Pass and was wounded 1864, Apr. 8; on leave from wound 1864, June—Nov.; was captured by Confederate raiders on a Philadelphia and Baltimore railroad train 1864, July 11, but escaped the next night; resigned as maj.gen. of vols. 1865, Nov. 9, and as col. 12th U. S. inf. 1866, Mar. 15. He was pres. of the commission for laying out Long Island City, N. Y., 1871-2, pres. of the new state-house commissioners of Conn. 1872-3, consulting eng. of the same 1874, state centennial commissioner 1876, pres. board of man. Nat. Home for disabled soldiers 1880-87, and U.S. com.-gen. to the Paris Exposition 1899. D. 1903.

FRANKLIN AND MARSHALL COLLEGE: educational institution at Lancaster, Penn., composed of Franklin College, founded at Lancaster 1787, and of Marshall College, founded at Mercersburg by the Ref. Church 1836, the consolidation taking effect 1853. The colleges were originally named after Benjamin Franklin and Chief-justice Marshall. The first presidents of Marshall College were the Rev. Frederick A. Rauch, D.D., and the Rev. John W. Nevin, D.D., LL.D. Within a few years the united institution has had a material increase in its endowment, a completely equipped astronomical observatory has been provided, the library enlarged, a new laboratory established, and a fine gymnasium erected. In 1902 it had 24 professors and instructors, 378 students, 1,233 alumni, and the Rev. John S. Stahr, D.D., was president.—The Theol. Seminary of the Ref. Church in the United States, founded at Carlisle, Penn., 1825, was removed to York 1829, to Mercersburg 1837, and to Lancaster and united with Franklin and Marshall College 1872. It is under control of the Eastern, Potomac, and Pittsburgh Synods of the Ref. Church: was the birthplace of the 'Mercersburg theology:' and 1902 had 5 endowed professorships, 60 students, 15,000 volumes in its library, and over 500 alumni. The Rev. Eml. V. Gerhart, D.D., LL.D., was president.

FRANKLINIC, a. *frängk-ĭn'ĭk* [from Benjamin *Franklin* (q.v.)]: term applied to electricity generated by friction; frictional.

FRANKLINITE, n. *frängk'ĭn-ĭt* [after Benjamin *Franklin*]: rare mineral, found chiefly in the zinc mines of Franklin Furnace, Sussex co., N. J., and at Altenburg, Germany. It is composed of peroxide of iron, oxide of zinc, and oxide of manganese, and is used in the manufacture of zinc paint and (the residue) Bessemer steel. It was named and described first by Samuel Fowler, M.D., who owned the Sussex co. zinc mines.

FRANK' MARRIAGE, (*liberum maritagium*): species of estate tail existing by the common law of England, where a man, on the marriage of his daughter or cousin, gave lands to be held in special tail. A gift in F. by a subject became impossible after the statute of *Quia emptores*, under Edward I.

FRANKPLEDGE, n. *frängk'plēj* [mid. L. *franciplēgi* (see **FRANK** and **PLEDGE**)]: in the *law of England* before the Norman Conquest, the security whereby the members of every tything were responsible for the good conduct of each other. This responsibility, according to Hallam, consisted in every ten men in a village being answerable each for the others, so that if one committed an offense, the other nine were liable for his appearance to make reparation. Should the offender abscond, the tything, if unable to clear themselves from participation in the crime, were compelled to make good the penalty. This law has been ascribed to Alfred the Great; but appears to have a much earlier date.

The *Court of Frank-pledge*, or *Court-leet*, in English usage, is a court of record held once in the year, within a particular hundred, lordship, or manor, before the steward of the leet: being the king's court granted by charter to the lords of those hundreds or manors. All freeholders resident in the jurisdiction are bound to attend this court; but persons under 12 and over 60 years of age are excused, and all prelates, peers, and clergymen, and women are discharged from attendance. It was the custom to summon all the king's subjects to this court, on attaining years of discretion, to take the oath of allegiance. This court has practically fallen into desuetude, and the business is discharged by the justices of the peace at general and petty sessions. See *Blackstone's Commentaries*.—Originally, the business of the court was confined to the taking securities or free pledges for every person within the jurisdiction; but this practice having fallen into disuse, the court gradually acquired a criminal jurisdiction relative to all trivial misdemeanors, concurrent with that of the sheriff's tourn.

FRANKS, n. *frängks* [i.e. freemen (see **FRANK** 1 and **FRANCHISE**)]: name designating a confederation of German tribes that appeared on the Lower Rhine in the 3d c., and afterward overthrew the Roman dominion in Gaul. Only the name was new; the individual tribes composing the confederation had been known on the Rhine as early as the time of Augustus. The most important were the Sigambri, Chamavi, Ampsivarii, Chatti, Chattuarii, and Bructeri of the time of the first emperors. In the 3d and 4th c., hordes of them began to pour through the low Countries into Gaul, until at last the country became their prey. After the middle of the 4th c., they appear divided into two groups, the Salians—either from the old Ger. *Sal*, or the river Sala (*Yssel*)—and the Ripuarians (*ripa*, the bank), the first inhabiting Holland and the Low Countries, the last on both sides of the Rhine as far up as the Main. Each group had its own laws, afterward committed to writing (*Lex Salica* and *Lex Ripuariorum*). Like the two peoples, these laws differ little even in detail. The F. were a mobile, well-endowed race, forming in language and art the transition from the Low Germans to the High; and they compose to this day the ground of the population of the west of Germany as far as the Neckar, Main, Murg, and Lower Alsace; as well as the chief Germanic element of the population of n. France. For the later history of the F. see **CLOVIS: CAR-**

FRANTIC—FRASER.

LOVINGIANS: CHARLEMAGNE: FRANCE: MEROVINGIANS: ETC.

Franks is the name in use among the Turks and other Eastern peoples for the English, Germans, French, Italians, etc.

FRANTIC, a. *frän'tik* [L. *phrēnēticus*, mad, delirious: It. *frenetico*; F. *phrénétique*; Gr. *phrēnītis*, disorder of the mind—from Gr. *phren*, the mind]: furious; outrageous; noisy; wild; transported by passion. **FRAN'TICLY**, ad. -*lī*, or **FRAN'TICALLY**, ad. -*āl-lī*. **FRAN'TICNESS**, n.

FRANZENSBRUNN, *frānts'ēns-brūn*, or **FRANZENSBAD**, *frānts'ēns-bāt*: small village and well-known bathing-place in Austria, on the n.w. frontier of Bohemia, three m. n.w. of Eger; amid low bare hills, and consisting of four rectangular streets lined with trees. It has four cold mineral springs, chiefly of alkalo-saline chalybeate water, deemed highly efficacious in the cure of scrofulous complaints and diseases of the skin, and used principally for drinking, but also for bathing purposes, in which the case the water is heated to a temperature of 90° to 98° F. Nearly 200,000 bottles of these waters are exported annually. F. has also mud and gas baths.

FRANZ-JOSEF LAND, *frānts'yō'zēf*: archipelago in the Arctic Ocean, n. of Nova Zembla, a little beyond the parallel of 80°. Its land-masses are mountainous, at least one peak being 5,000 ft. high. The archipelago was discovered by the Payer-Wayprecht expedition 1873, and named after the Austrian emperor. It was visited by the *Willem Barents* 1879, and the s. coasts were explored by Leigh Smith 1880.

FRAP, v. *frāp* [F. *frapper*, to strike: Icel. *hrappa*, to handle roughly]: in *seamen's language*, to cross and draw together the several parts of a tackle to increase the tension; to strengthen by passing a rope around; to undergird. **FRAP'PING**, imp. **FRAPPED**, pp. *frāpt*.

FRASCATI, *frās-kā'tē*: beautiful town about eight m. e.s.e. of Rome, on the lower heights of the Alban Hills, not far from the site of ancient Tusculum which was burned and ruined by the Romans 1191. The chief attractions of F. are its lovely villas and salubrious air, which render this resort in the Alban Hills the most fashionable *villaggiatura* in the vicinity of the Eternal City. The most splendid of the summer residences are the villas Aldobrandini, known also as Il Belvedere, from the commanding and noble prospect; those of Mondragon and Taverna of the Borghese family; the villas Pallavicini and Piccolomini. The cathedral contains a tablet to the Cardinal of York, for many years bishop of this diocese, and another to his brother, Charles Edward, the Young Pretender, who died here 1788. Pop. abt. 7,000.

FRASER, *frā'zēr*, ALEXANDER CAMPBELL, D.C.L., LL.D.: educator and author: b. Ardochattan, Scotland, 1819, Sep. He was educated in the universities of Glasgow and Edinburgh. obtained the univ. prize in the latter with an essay on *Toleration* 1842, was editor of the *North British Re-*

FRASER.

view 1850–57, became prof. of logic and metaphysics in the Univ. of Edinburgh 1857 and dean of the faculty of arts 1859, and still (1889) holds the offices. He has been an examiner in moral science and logic at the India civil service examinations since 1872, has represented the senatus academians in the Edinburgh Univ. court since 1877, and during the past 30 years has been a frequent contributor to leading encyclopedias and periodicals, beside publishing many philosophical, educational, and biographical works. He received the degree LL.D. from Glasgow Univ. 1871, and D.C.L. from Oxford 1883.

FRASER RIVER, *frā'zēr*: principal stream of British Columbia, comprising in its basin the far greater part of the colony. The F. proper has its origin in the union of two branches, the more important of which receives its waters from a series of lakes in lat. 54° – 55° n., long. about $124^{\circ} 50'$ w.; flows in general s.e. 260 m.; and then unites with the other branch which has its source near Mount Brown, in the Rocky Mountains, lat. 53° n., long. $118^{\circ} 40'$ w., flows n.w., and is 200 m. in length. The point of confluence is near Fort George, lat. about $53^{\circ} 25'$ n., and long. about $122^{\circ} 40'$ w., and hence the F. flows generally s. through nearly the whole length of the colony; and after a total course of 740 m. it falls into the Gulf of Georgia between Vancouver's Island and the mainland, barely n. of the U. S. boundary of 49° of latitude. Its chief affluents are the Stuart and the Chilcotin on the right, and the Thompson on the left. Between the Stuart and the Chilcotin, and on the same side, the F. is joined by a small affluent, of historical interest—the West Road river, named from its having been ascended by Sir Alexander Mackenzie, on his adventurous journey 1793 from the Hudson's Bay Territories to the Pacific Ocean. The F. is practicable for steamboats as far up as Fort Hope, about 150 m. from its mouth, while about half that distance, as far as New Westminster, it is navigable for large ships. Above Fort Hope all intercourse is more safely and conveniently conducted by land; as the trails even of the aborigines still testify.

In 1857, the region of this river, in its auriferous diggings and washings, began to stand forth as the rival of California and Australia. Since then, the discoveries, originally confined to the lower basin, have steadily become more extensive and more productive. Eastward on the Thompson, and especially northward among the upper waters of the great artery of the country, the precious deposit has sometimes given almost fabulous returns. The mining operations here are almost wholly in the hands of Chinese and Indians. It was estimated that in 1875 they secured gold to the amount of 50,000 dollars. Specimens of silver also have been found on the F., so rich as to justify extensive works. The river, its tributaries, and the numerous lakes communicating, furnish great facilities for transport of timber. The lower F. country is especially densely wooded. The salmon of the river, of which there are five species, are justly famous; and there are numerous canneries or stations where they are put into cans for ex-

FRASER—FRATICELLIANS.

portation. The Canadian Pacific railway crosses the river at Lytton, and, on its n. bank, is parallel to its lower course. Steamers pass up to Yale.

FRA'SER, SIMON: see LOVAT, LORD.

FRASERA, *frā'zē-ra*: genus of plants of nat. ord. *Gentianeæ*, with a 4-partite calyx and corolla, 4 stamens, and a 2-valvular capsule. *F. Walteri*, nativé of the Carolinas, Virginia, and great part of the basins of the Ohio and Mississippi, is often called American Calumba, the root being imported into Europe under that name. It is a pure and valuable bitter, similar in effects to gentian. The stem is herbaceous, erect, 3-6 ft. high; the leaves oval, oblong, opposite and whorled; the flowers greenish yellow. The plant is a biennial. It grows in marshy places.

FRASERBURGH, *frā'zēr-bŭr-rō*: burgh of barony and regality and seaport on the n. coast of Aberdeenshire, Scotland, 42 m. n. of Aberdeen. It is on the n.w. side of a bay two m. in extent inland immediately south of Kinnaird's Head (supposed to be the *Taixalorum Promontorium* of the Romans), on which is the Wine Tower, an old castle with a cave below. The town, originally called Faithly, was made a burgh of barony by Queen Mary 1546. Its name was changed into Fraserburgh (in honor of its proprietor, Sir Alexander Fraser of Philorth) by King James VI. 1592; and the same king, 1601, erected it into a free port, free burgh of barony, and free regality. The streets are wide and clean, with substantial houses. F. has one of the best harbors on the e. coast. The chief exports are oats, barley, meal, potatoes, cured herrings, and cod. F. is now one of the most successful herring-fishing stations on the e. coast of Scotland, the average number of boats being between 700 and 800. Since 1865, it has been connected with Aberdeen by railway. F. has a handsome cross and town-house in the principal square, and a spacious hall belonging to the Harbor Commissioners. Pop. of parish about 7,600, annually increased to 10,000 in the herring-fishing season, July and August.

FRASIER: a strawberry flower, used by Scotch heraldic writers as synonymous with a cinquefoil.

FRATER'CULA: see PUFFIN.

FRATERNAL, a. *frā-tēr'nāl* [F. *fraternel*—from L. *fraternālis*—from *frāternus*, brotherly—from *frātēr*, a brother: It. *fraterno*]: pertaining to brothers; brotherly; becoming brothers. FRATER'NALLY, ad. -*lī*. FRATER'NITY, n. -*nī-tī* [OF. *fraternite*—from L.]: a brotherhood; a society; men of the same class or profession. FRATERNIZE, v. *frāt'ēr-nīz*, to associate or hold fellowship as brothers. FRAT'ERNIZING, imp. FRAT'ERNIZED, pp. -*nīzd*. FRAT'ERNIZER, n. -*zēr*, one who. FRAT'ERNIZA'TION, n. -*nī-zū'shŭn*, the act of uniting as brothers.

FRATICELLIANS, *frāt-ī-sē'l'li-anz*, or FRATICELLI, *frāt-ī-sē'l'li* (Little Brethren'): sect of the middle ages, an embodiment outside the mediæval church of the same spirit which is due, within the church, the Franciscan order with its many offshoots. The Italian word *Fraticelli* origin-

ally was the popular name of the Franciscan monks; but in the progress of the disputes which arose in the order (see FRANCISCANS), the name was specially attached to the members of the rigorist party, and eventually to those among them who pertinaciously refused to accept the pontifical explanations of the monastic rule, and, in the end, threw off all subjection to the authority of the church. Several of the popes, especially Gregory IX. and Nicholas III. attempted to reconcile the disputants. Pope Celestine V. granted permission to the rigorists to form a separate organization, in which the rule of St. Francis might be observed in all its primitive and literal rigor. The suppression of this order by Boniface VIII. appears to have furnished the direct occasion for the secession of the extreme party from the church. They openly resisted the authority of the pope, whom they proclaimed an apostate from the faith. The party thus formed was increased by adhesions from other sectarian bodies, as the 'Beghards' and the 'Brethren of the Free Spirit' (see FREE SPIRIT). In vain Clement V., in the council of Vienna (1311-12), put forward a new declaration regarding the rule of St. Francis. They still held their ground, especially in Sicily, central and n. Italy, and Provence. John XXII., against whom they sided actively with Louis of Bavaria, condemned them by a special bull 1317, and again in a similar document directed against Henry de Ceva, one of their chief leaders in Sicily. From these sources we learn that they regarded the existing church as in a state of apostasy; and claimed for their own community the exclusive title of the Church of God. They forbade oaths, and discountenanced marriage. They professed a divine mission for the restoration of the Gospel truth. They held that all spiritual authority was forfeited by sin on the part of the minister. They appear to have even proceeded so far as to elect for themselves a pope, with a college of cardinals, and a regular hierarchy (Wadding, *Annal. Min. Fratrum ad an. 1374*, n. 20). Their principles, in a word, seem to have partaken largely of the same fanatical and anti-social tendencies which characterized the Brethren of the Free Spirit; and in common with them, the F. were the object of a rigorous persecution about the middle of the 14th c. The principles of this sect formed the subject of a public discussion at Perugia 1374 between them and a Franciscan monk named Paolucci, which appears to have ended in their discomfiture. They maintained themselves, nevertheless, in central Italy, till the 15th c., when John de Capistran received a commission to labor for their conversion in the March of Ancona; but before the beginning of the following century, they disappeared, at least from modern recognition. See Mosheim, *De Beghardis et Beguinabus* (Lipsiæ 1790); Milman's *Latin Christianity*, V.; Herzog's *Real-Encyclopædie*.

FRATRICIDE, n. *frāt'rī-sīd* [F. *fratricide*—from L. *fratrīcīdā*, a brother's murderer—from *frātēr*, a brother; *cādērē*, to kill, to murder: It. *fratricida*]: one who murders or kills a brother; the murder of a brother. FRAT'RICI'DAL, a. -sī'dāl, pertaining to fratricide.

FRATTA-MAGGIORE —FRAUD.

FRATTA-MAGGIORE, *frát'tá mád-jō'rā*: town of Italy, six m. n. e. of the city of Naples. It has extensive rope-works, and furnishes great quantities of strawberries for the market of the capital. Silk-worms are reared in great quantities. Pop. about 11,000.

FRAUD, n. *fraud* [F. *fraude*—from L. *fraudem*, cheating; It. *fraude*]: deception; trick; artifice; a deceitful act by which the right or interest of another is injured. **FRAUDFUL**, a. *-fúl*, full of fraud or deceit; treacherous; deceitful. **FRAUD'FULLY**, ad. *-lì*. **FRAUD'LESS**, a. *-lès*, without fraud. **FRAUD'LESSLY**, ad. *-lì*. **FRAUD'LESSNESS**, n. **FRAUDULENT**, a. *fraud'ũ-lènt*, founded on or obtained by fraud; unfair; dishonest. **FRAUDULENTLY**, ad. *-lì*, in a fraudulent manner; by deceit. **FRAUD'ULENCE**, n. *-lèns*, or **FRAUD'ULENCY**, n. *-lèn sî*, deliberate deceit; the overreaching of another.—**SYN.** of 'fraud': deceit; cheat; cunning; subtlety; subtility; stratagem; treachery; artfulness; guile; craft; wile; sham; circumvention; imposition; insidiousness; dishonesty; knavery.

FRAUD: deceitful act to the injury of any person. By the laws of all civilized nations F. invalidates obligations. To produce this effect, however, it is necessary that the misrepresentations or other dishonest maneuvers of the offending party shall have induced the other party to enter into the agreement or contract, to which he would not otherwise have consented. F. of this description on the one side produces *error in essentialibus* on the other; and where such error exists there is no consent. But as consent is of the essence of the contract, there is here no contract at all; i.e., the contract, or pretended contract, is, as lawyers say, null *ab initio*. It is not necessary that the F. which thus gives rise to the contract shall have consisted in positive misrepresentation, or even in studied concealment; and it was well laid down in the case of an English sale, that where the purchaser was under a deception in which the seller permitted him to remain, on a point which he knew to be material in enabling him to form his judgment, the contract was void. But there is another kind of F. which, though it be not actually the cause of, is incident to, the contract, and which, though it do not annul the contract, gives rise to an action for damages or restitution by the party deceived. The distinction between these two kinds of F. was well known to the civilians, the first species being described by them as that '*quod causam dedit contractui*,' that is to say, which causes the contract: the second as that '*quod tantum in contractum incidit*,' which is incident to, or accompanies the contract, but independently of which the contract would have been entered into (Voet. lib. 4, tit. 3, 3). Another very important element is to be taken into account in judging of the character, and determining the legal effects of a F., viz., whether it proceeded from one whose position was such as to impose upon him the obligation of making the discovery. In illustration of this principle, the following case was put by Lord Thurlow in *Fox v. Mackreth* (2 Bro. Ch. R. 420): 'Suppose that A. knowing there

FRAUDULENT CONVEYANCE.

to be a mine on the estate of B, of which he knew B was ignorant, should enter into a contract to purchase the estate of B for the price of the estate, without considering the mine, could the court set it aside? Why not, since B was not apprised of the mine, and A was? Because A, as the buyer, was not obliged, from the nature of the contract, to make the discovery. . . . The court will not correct a contract merely because a man of nice honor would not have entered into it; it must fall within some definition of fraud. The rule must be drawn so as not to affect the general transactions of mankind.' Neither will the commendations usually bestowed on their commodities by tradesmen be regarded as fraudulent statements, so long as the statements are simply extravagant in degree; but if positively at variance with facts known to them, they will not receive the protection which custom has extended to ordinary 'puffing.' The same principle will yield the converse result wherever a relation of peculiar confidentiality exists between the contracting parties. Here courts of law require what is called *uberrima fides*, the fullest measure of good faith, to validate the transaction. As an illustration may be mentioned a case in which a managing partner of a firm purchased the share of his co-partner for a sum which he knew from the accounts, of which he had the entire superintendence, to be inadequate, but the inadequacy of which he concealed. The transaction was reduced, Sir John Leach, v.c., remarking that 'the defendant being the partner whose business it was to keep the accounts of the concern, could not, in fairness, deal with the plaintiff for his share of the profits of the concern without putting him in possession of all the information which he himself had with respect to the state of the accounts between them. —*Maddeford v. Austwick*, 1 Gim R. 89.—In addition to direct misrepresentation and concealment in circumstances in which open dealing was a duty, F. may be perpetrated by taking advantage of the imbecility of the party who has been led into the contract, and still more flagrantly by inducing this imbecility by intoxication or otherwise. See CONCEALMENT: ERROR: MISREPRESENTATION: CONTRACT. In addition to the ordinary English sources of information, we may refer to the extensive and learned *Traité du Dol et de la Fraude*, par J. Bédarride, 3 vols. (Paris 1852).

The statute of frauds applies both to law and equity courts; though equity has in some cases an exceptional privilege of granting relief beyond the strict line of the law.

FRAUDULENT CONVEYANCE: conveyance intended or liable to defraud another directly or by the avoidance of a duty or debt due or incumbent on the party making it. The common law of England held all conveyances made with intent to defraud creditors to be void, and existing statutes declare that a voluntary conveyance shall be deemed fraudulent against a subsequent purchaser even with notice. These statutes have been generally adopted in the United States at least as the basis of all enactments on the subject in the different states, except that in the matter of voluntary conveyances the subsequent purchaser has

FRAUENBURG—FRAXIN.

notice, especially where there is a good consideration. It is held in both countries that while a voluntary conveyance is void as regards purchasers and creditors, it is valid as between the immediate parties.

FRAUENBURG, *frow'ën-bûrg*: town of Prussia, prov. of e. Prussia, on the Frische-Haff. 42 m. s.w. of Königsberg. It is the seat of a Rom. Cath. bp., and is celebrated for the six-towered cathedral of Ermeland, which has been used also as a fortress and a water-work and contains the tomb of Copernicus, who died in F. 1543: the machinery for the water-work preserved in one of the towers is said to have been constructed by him. Pop. 4,000.

FRAUENFELD, *frow'ën-fëlt*: town, cap. of canton of Thurgau, Switzerland, on the Merz, 21 m. n.e. of Zurich. It is the artillery depot of e. Switzerland, and contains a cantonal school embracing a gymnasium and industrial dept. There are several cotton-mills and dyeing and print works. The majority of the people belong to the Ref. Church and pursue agriculture. Pop. 5,811.

FRAUGHT, a. *frawt* [Sw. *frakta*; Ger. *frachten*, to freight; Ger. *fracht*; F. *fret*, the loading of a wagon or ship, the money paid for conveyance (see **FREIGHT**)]: filled; stored: laden; OE. pp. of the v. *freight*: N. in *OE*, for freight: V. in *OE*, to burden. **FRAUGHTED**, pt. pp. burdened. **FRAUGHTAGE**, n. *frawt'āj*, in *OE*, a cargo; the lading of a ship.

FRAUNHOFER, *frown'ho fər* JOSEPH VON: 1787, Mar. 6—1826, June 7; b. Straubing, Bavaria: practical optician. In 1799 he was apprenticed to a glass cutter in Munich, and 1806 was received, as a working optician, into the establishment of Reichenbach and Utschneider at Benedict-beurn (removed 1813 to Munich). While there, he acquired considerable wealth through his inventions, and became proprietor of the establishment. He invented a machine for polishing parabolic surfaces, and was the first who succeeded in polishing lenses and mirrors without altering their curvature. His prisms also were celebrated, being free from the blebs and striæ often seen in those of English manufacture. His inventions are numerous, and include a 'heliumeter,' a 'micrometer,' an 'achromatic microscope,' besides the great parallactic telescope at Dorpat. But that which has rendered F.'s name celebrated throughout the scientific world, is his discovery of the lines in the spectrum. He died at Munich.

FRAUN'HOFER'S LINES: see **SPECTRUM**.

FRAUSTADT, *frow'stāt* (Polish, Wszowa): town of Prussia, govt. of Posen, in a sandy plain on the Silesian frontier, 55 m. n.w. of Breslau. It has important grain markets, and near it are many windmills. Pop. (1890) 6,851.

FRAXETIN, n. *fräks'ë-tin* [L. *fraxinus*, an ash-tree]: $C_{10}H_8O_5$: substance obtained with glucose by digesting fraxin with dilute sulphuric acid.

FRAXIN, n. *fräks'in* [L. *fraxinus*, an ash tree]: a

FRAXINELLA—FRECKLE.

crystalline substance obtained from the bark of the ash-tree and horse chestnut, forming a complex glucoside.

FRAXINELLA, n. *fräks-ì-nèl la* [dim. of L. *fraxinus*, ash-tree]: name given to two rutaceous plants, *Dictamnus fraxinella* and *D. albus*, cultivated for their fragrant leaves and flowers: see **DITTANY**.

FRAXINUS, n. *fräks'ì'nūs* [L. an ash-tree]: genus of plants belonging to the order *Oleaceæ* (Oliveworts): see **ASH**.

FRAY, n. *frā* [contr. of **AFFRAY**, which see: comp. Gael. *freadh*, pillage, plunder]: a broil; a quarrel; a contest: V. to terrify; to frighten.—**SYN.** of 'fray, n.': difference; dispute; altercation; feud; combat.

FRAY, v. *frā* [*F* *frayer*, to rub, to wear—from L. *fricāre* to rub]: to rub; to wear away by rubbing; to tease out or unravel an edge of cloth: N. a rough or jutting part which requires to be dressed and rubbed off. **FRAY'ING**, imp. **FRAYED**, pp. *frād*. **FRAYED**, a. or **FRAISED**, a. *frāzd*, having the rough or undressed parts taken off; having the threads at the edges rough and sticking out. **FRAYINGS**, n. plu. *frā'ingz*, the rough parts scraped or rubbed off.

FRAZ'ERA. see **FRASERA**.

FRAZIER'S FARM, BATTLE OF: in the war of secession, 1862, June 30. At early morning the retreating army of the Potomac crossed White Oak Swamp, while an advanced portion had reached James river, when the Confederate army under Gens. Jackson and Longstreet, divided into two columns, attempted to intercept McClellan's army. Longstreet flanked the swamp and bisected the Quaker road along which McClellan was passing. Hastening forward the Confederates arrived within a mile of the junction of the Quaker and New Market roads at noon, found the Union forces in possession, and Longstreet began the attack without awaiting Jackson's appearance. Jackson was prevented joining Longstreet, the Confederates were defeated in their purpose, and McClellan reached Malvern Hill and re-established communication with the James river the next morning. Confederate loss 2,000; Union 1,800. See **CHICKAHOMINY, BATTLES OF**.

FREAK, n. *frēk* [AS. *frece*, bold, rash: Icel. *frekr*, voracious, greedy: Ger. *frech*, saucy: comp. Gael. *fraoch*, an outburst of anger or petulance]: a flighty humor or fancy; a whim; a sudden fancy; a prank. **FREAK'ISH**, a. capricious; whimsical. **FREAK'ISHLY**, ad. -ly. **FREAK'ISHNESS**, n.—**SYN.** of 'freak': caprice; humor; whim; fancy; fickleness; variableness; changeableness; folly; sport.

FREAK, v. *frēk* [It. *fregare*, to rub, to streak: *frego*, a dash, a stroke]: in *OE.*, to streak; to variegate; to checker. **FREAK'ING**, imp. **FREAKED**, pp. *frēkt*. *Note.*—**FREAK 2** may be connected with **FRECKLE**, which see

FRECKLE, n. *frēk'l* [Icel. *frekna*; Norw. *frukne*, freckles: Ger. *fleck*, a spot, a stain: Gael. *bhreac* = *frēch*, speckled, spotted]: a yellowish spot on the skin; any small discolored spot on the skin: V. to produce freckles on. **FRECK'LING**, imp. **FRECKLED**, pp. *frēk'ld*: **ADJ.** having

FREDERICIA—FREDERICK I.

small yellowish spots on the skin or surface. **FRECK'LY**, *a*-*li*, covered withreckles: see **MACULÆ**.

FREDERICIA, *frĕd-ĕh-rĭsh'ĕ-a*: seaport and fortress of Denmark, on the e. coast of the province of Jutland, on a projecting tongue of land, at the n. entrance to the Little Belt. It is fortified with nine bastions and three ravelins on the landside, and with two bastions toward the sea. It has several ecclesiastical edifices, a hospital, and a custom-house, at which toll used to be paid by ships passing through the Little Belt. Tobacco is grown and manufactured here. Pop. (1880) 8,275; (1890) 10,044.

FREDERICK, *frĕd'ĕr-ĭk* (Ger. **FRIEDRICH**, *frĕd'rĭch*) I., Emperor of Germany—surnamed **BARBAROSSA** (Redbeard). 1121-89 (Emp. 1152-90): succeeded his father, Frederick Hohenstaufen, as Duke of Swabia 1147; succeeded his uncle, Conrad III., as emperor. He was one of the most enlightened and powerful rulers who ever swayed the imperial sceptre. In his desire to emulate Charlemagne, and to raise the secular power of the empire in opposition to the arrogated supremacy of the papal chair, he was brought into constant collision with his Italian subjects. Six times he was compelled to cross the Alps at the head of great armies, in order to chastise the refractory cities of Lombardy, which were ever ready, on the slightest provocation, to throw off their allegiance. In the early periods of his reign, he visited their defection with undue severity; but in his latter days his conduct toward them was characterized by a generous leniency and a politic liberality in advance of his age; and in 1183, he convoked a council at Constance, in which he finally agreed to leave the Lombard cities the right to choose their own municipal rulers, and to conclude treaties and leagues among themselves, though he retained his supremacy over them, with the power of imposing certain fixed taxes. The difficulty of settling the Italian differences was as usual aggravated in F.'s time by the attitude assumed by the occupants of the papal chair, and at one time Italy was distracted by the pretensions of two rival popes, Alexander III. and Victor IV., who each excommunicated the other, and hurled the anathemas of the church against their several opponents; and it was not till 1176 that F., after his defeat at Lignano, by consenting to acknowledge Urban II., successor of Alexander III., as the rightful pope, was enabled to turn his attention to Germany. By his energetic measures, he succeeded in thoroughly humbling his troublesome vassal, Henry the Lion, Duke of Brunswick, and thus crushing the Guelfic power in Germany. F. made Poland tributary to the empire, raised Bohemia to the rank of a kingdom, and the markgrafdom of Austria into an independent hereditary duchy. In 1189, F., having settled the affairs of the empire, and proclaimed universal peace in his dominions, resigned the government to his eldest son Henry, and at the head of 100,000 men, set forth for the Holy Land, accompanied by his second son, Frederick of Swabia, founder of the order of **Teutonic Knights**. After gaining two great victories over the

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Saracens at Philomelium and Iconium, he was drowned in a river of Syria, while trying to urge his horse across the stream. His remains were rescued by his son, and buried at Tyre. The death of F., which led to the dispersion of the Crusaders before any material advantage had been obtained over the Infidels, excited the deepest grief in Germany, where his memory has always been cherished as that of the best and wisest of his race. F. was a patron of learning, and enacted many admirable laws, some of which are still in force.

FREDERICK II., Emperor of Germany: 1194-1251 (Emp. 1212-51): grandson of Emperor Frederick I.; and son of Emperor Henry VI. and of Constance, heiress of Sicily. His mother secured the favor of Pope Innocent III. for her infant son by conceding many important privileges to the papal chair; and after the civil war which had raged in Germany for eight years between the rival claimants of the throne, Philip of Swabia and Otho IV., was ended by the agency of Innocent, F. succeeded (1212) in obtaining the support of the German electors. On his promising to undertake a crusade, the pope sanctioned his coronation at Aix-la-Chapelle 1215. Like his grandfather, F. was actuated by an ardent desire for the consolidation of the imperial power in Italy at the expense of the pontificate, which he wished to reduce to the rank of a mere archiepiscopal dignity. Having secured the nomination of his son Henry to the rank of king of the Romans, and appointed Abp. Engelbert of Cologne as his vicegerent, he left Germany; and after having been crowned emperor at Rome 1220 applied himself to the task of organizing his Italian territories. He founded the university of Naples, gave encouragement to the medical school of Salerno, invited to his court and patronized men of learning, poets, and artists, and commissioned his chancellor, Petrus de Vineis to draw up a code of laws to suit all classes of his German and Italian subjects. F.'s schemes for the union of his vast and widely scattered dominions were, however, frustrated by the refractory conduct of the Lombard cities, and still more by the arrogance of the popes Honorius III. and Gregory IX. who threatened him with excommunication unless he fulfilled his pledge of leading a crusade. Being compelled to depart on this expedition, he made the necessary preparations for its prosecution; but a pestilence broke out among his troops in the Morea, and he returned in haste to Italy, only to be again forced away by papal threats. This second attempted crusade proved more successful; and 1228, notwithstanding the machinations of the pope, and the treachery of the Knights Templars, F. extorted a ten years' truce from the Moslem ruler and forced him to give up Jerusalem and the territory around Joppa and Nazareth. The rest of his life was spent in bringing his rebellious Lombard subjects to subjection, and in counteracting the intrigues of the pope, the rebellion of his eldest son, and the treachery of his friend and minister, the Chancellor de Petrus de Vineis, who was suspected of attempting to poison him. F., who

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died suddenly. the possessor of seven crowns, was the most accomplished sovereign of the middle ages, for he not only spoke and wrote the six languages common to his subjects, but he was famed for his talents as a minnesinger, and for his skill in all knightly exercises, while he wrote elaborate treatises on natural history and philosophy. His strong sympathies with his Italian mother-land, and his unremitting endeavors to establish a compact and all-supreme empire in Italy, were the causes, not only of his own misfortunes, but of the miseries which he brought upon the German empire, by embroiling him in costly wars abroad, and leading him to neglect the welfare, and sacrifice the interests of his German subjects. See for Frederick I. and Frederick II., Raumer, *Geschichte der Hohenstauffen*; Sismondi, *Italian Republics*, and *Europe in the Middle Ages*; Voigt's *Lombardenbund*; Funk, *Geschichte Kaiser Friedrich II.*

FREDERICK III., Emperor of Germany (F. IV. as King of Germany, F. V. as Duke of Austria): 1415-93 (Emp. 1440-93): son of Duke Ernst, of the Styrian branch of the House of Hapsburg. At the age of 20, he undertook an expedition to the Holy Land; and on his return, in conjunction with his factious brother, Albert the Prodigal, he assumed the government of his hereditary dominions of the Duchy of Austria, the revenues of which scarcely exceeded 16,000 marks. On the death of Emperor Albert II., he was unanimously elected as his successor; and two years afterward, 1442, he was solemnly crowned at Aix la-Chapelle; ten years later, he received the imperial crown at the hands of the pope at Rome, and 1453 secured the arch-ducal title to his family. His reign was a prolonged struggle against domestic intrigues and foreign aggressions. One of his most troublesome opponents was his brother Albert, who refused to give up the provinces which he held until he had received a large sum of money; but notwithstanding these causes of annoyance, and while John Hunyades Corvinus at the head of a Hungarian army overran Austria and laid siege to Vienna, and the usurper Sforza possessed himself of the imperial fief of Milan on the extinction of the male line of the Visconti, F. remained absorbed in his own private studies, or roused himself only to attempt, by the aid of foreign mercenaries, to recover the crown-lands of which the House of Austria had been deprived. His brother Albert's death 1463 secured him a short reprieve from internal disturbances, and gave him possession of Upper Austria; but he was repeatedly embroiled in quarrels with Podiebrand, King of Hungary, and Matthias Corvinus, King of Bohemia; the latter of whom several times besieged Vienna, and finally dispossessed him of every town of importance in his hereditary domains. Meanwhile, the Turks were suffered to push their conquests in Europe until they had advanced in 1456 to Hungary, in 1469 to Carniola, and in 1475 to Salzburg, though a vigorous opposition at the outset would easily have put a stop to their encroachments. On the death of Matthias, 1490, F. recovered Austria, but he was obliged to

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acknowledge Prince Ladislaus of Bohemia as king of Hungary. This mortification was soon followed by his death, after an inglorious reign of 53 years. F. never lost an opportunity of promoting the aggrandisement of his own family, which he materially secured by marrying his son and successor, Maximilian, to Mary, the rich heiress of Charles the Bold of Burgundy. F. was temperate, devout, parsimonious, scrupulous about trifles, simple in his habits, pacific in his disposition, and naturally averse to exertion or excitement. From this time, the imperial dignity continued almost hereditary in the House of Austria, which has perpetuated the use of his favorite device, A.E.I.O.U., *Austriæ Est Imperare Orbi Universo*. See Æneas Sylvius, *Historia*; Coxe, *House of Austria*.

FREDERICK IV., King of Germany: see FREDERICK III., Emperor of Germany.

FREDERICK I., first King of Prussia; F. III. as Elector of Brandenburg: 1657–1713, Feb. 25 (Elector 1688–1713, King, 1701–1713); son and successor of Frederic William of Brandenburg. He had the same zeal as his father for the aggrandisement and amelioration of his dominions; but differed from him in his admiration of Louis XIV., whose pomp and luxurious display he imitated at his own court. He supported William of Orange in his attempt on England, and gave him a subsidy of 6,000 men, which, under the command of Marshal Schomberg, contributed to the victory at the Boyne which decided the fate of James II. F. was always ready to lend troops and money to his allies; he sent 6 000 of his best men to aid the Imperialists against the Turks; and though he met with the same ingratitude as his father, he succeeded, by treaties, exchanges, and purchases, in considerably extending his territories; and after many years' negotiations, he induced the Emperor to agree to the 'Crown Treaty,' by which, in return for permission to assume the title King of Prussia, F. bound himself to furnish certain contingents of men and money to the imperial government. As soon as this treaty had been signed, F. hastened in mid-winter with all his family and court to Königsberg, where, 1701, Jan. 18, he placed the crown on his own head. F. did much to embellish Berlin, where he founded the Royal Acad. of Sciences, and the Acad. of Painting and Sculpture, erected several churches, and laid out numerous streets. He established a court of appeal at Berlin, built the palace of Charlottenburg, and founded the Univ. at Halle; but his actions were generally influenced by a love of display; and his vanity, with his neglect of those who had served him, made him personally unpopular, though his patriotic love of Germany redeemed, in the eyes of his countrymen, many of his bad points.

FREDERICK II., surnamed 'THE GREAT,' King of Prussia: 1712–86 (reigned 1740–86): son of Frederick-William I and the Princess Sophia-Dorothea, daughter of George I. of Great Britain. His early years were under the restraints of an irksome military training, and a rigid

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system of education. His impatience under this discipline, his taste for music and French literature, and his devotion to his mother, gave rise to dissensions between father and son, and resulted in an attempt on the part of F. to escape to the court of his uncle, George II. of England. Being seized in the act, his conduct was visited with still greater severity, and he himself was kept in close confinement, while his friend and confidant, Lieut. Katt, was executed in his sight, after having been barbarously ill-treated by the king. According to some reports, the prince's life would have been sacrificed to the fury of his father, had not the kings of Sweden and Poland interceded in his favor. Having humbly sued for pardon, he was liberated, and allowed to retire to Ruppín, which, with the town of Rheinsberg, was bestowed upon him 1734. Here he resided till the king's death, surrounded by men of learning, and in correspondence with Voltaire, whom he especially admired, and other philosophers; but on his accession to the throne he laid aside these peaceful pursuits, and at once gave evidence of talent as a legislator, and of determination to take an active share in the political and warlike movements of the age. His first military exploit was a victory at Mollwitz over the Austrians, 1741, which nearly decided the fate of Silesia, and secured to Prussia the alliance of France and Bohemia. Another victory over Empress Maria Theresa's troops made him master of Upper and Lower Silesia, and closed the first Silesian war. The second Silesian war, which ended 1745, from which F. retired with augmented territories and the reputation of being one of the first commanders of the age, was followed by a peace of 11 years, which he turned to the improvement of the various departments of government and of the nation generally, to the organization of his army, and the indulgence of his literary tastes. The third Silesian war, 'the Seven Years' War,' was begun 1756 by the invasion of Saxony—a step to which F. was driven by the fear that he was to be deprived of Silesia by the allied confederation of France, Austria, Saxony, and Russia. This contest, one of the most remarkable of modern times, secured to F. a decided influence in the affairs of Europe generally, as the natural result of the pre-eminent genius which he had shown both under defeat and victory; but though this war crippled the powers of all engaged in it, it left the balance of European politics unchanged. It required all the skill and inventive genius of F. to repair the evils which his country had suffered by the struggle. In 1772, he shared in the partition of Poland, and obtained as his portion all Polish Prussia and a part of Great Poland; and by the treaty of Teschen, 1779, Austria was obliged to consent to the union of the Franconian provinces with Prussia, and he was thus enabled to leave to his nephew and successor a powerful and well-organized kingdom, one-half larger in area than it had been at his own accession, with a full treasury, and an army of 200,000 men. He died at the château of Sans Souci, 1786, Aug. 17. Frederick the Great is said to have 'inherited all his father's excellences and none of his de-

fects.' His courage, fertility of resource, and indomitable resolution, cannot be too highly praised. Not the least wonderful of his achievements was his contriving to carry on his bloody campaigns without incurring a penny of debt. A true spirit of self-sacrifice—though not, perhaps, for highest ends—was in him. Never was king more liberal towards his subjects. In Silesia, where war had nearly ruined the inhabitants, he once remitted the taxes for six months, and in Pomerania and New Brandenburg for two years, while his government was carried on with rigid economy, such as Europe had never before witnessed. But not only was his government economical, it was essentially just. Religious persecution was unknown, civil order everywhere prevailed; property was secure, and the press was free. On the other hand, F.'s faults were far from being few. Education had made him French in all his ideas and prejudices; and in those days to be French was to be skeptical, not so much with the skepticism that often arises from intellectual awakening, as with the skepticism that consists in moral stupor. He was utterly unconscious of the grand intellectual and spiritual life that was about to spring forth in Germany and to make it again the guiding-star of Europe as in the days of Luther. He was, in fact, almost ignorant of his native language which moreover, he despised as semi-barbaric; though before his death Goethe had published his *Götz von Berlichingen*, *Sorrows of Werther*, *Iphigenia in Tauris*, and many of his finest lyrics; while Kant, besides a variety of lesser works, had also given to the world his masterpiece, the *Critique of Pure Reason*. The new literature was essentially one of belief and aspiration, and therefore alien to the tendencies of the royal disciple of Voltaire, who had learned from his master to cherish at once contempt and suspicion of his fellow-creatures. This disagreeable feature of his character increased with years. He declared the citizen class to be destitute alike of ability and honor, and relied not on the love of the nation, but on his army and purse. F. was a very voluminous writer. Of his numerous works, all in French, *Mémoires pour servir à l'Histoire de Brandebourg*, and *Histoire de la Guerre de Sept Ans*, show perhaps the greatest powers of description, but all evince talent of no common order. The Acad. of Berlin, by the direction of Frederick-William IV., brought out a fine edition of his collected works in octavo and quarto, 1846-51. Frederick left no children, and was succeeded by his nephew, Frederick-William II. See Carlyle, *History of Frederick II.*; Macaulay's *Essay*; and the lives by Dohn, Preuss, Förster, Kugler, Droysen, Klopp, Pelletan (1878).

FRED'ERICK I., German Emperor, and (III.) King of Prussia: 1831, Oct. 18—1888, June 15 (reigned 1888, Mar. 9—June 15); son of William I., Emperor of Germany and King of Prussia, and of Princess Augusta of Weimar. He was known before his accession, as the Crown Prince Frederick William; entered the military service at an early age, rose to the rank of gen., and held numerous appointments, but did not show noticeable military skill till the

war between Prussia and Austria 1866, when he commanded an army of 120,000 men and decided the contest by a sudden and brilliant movement at Sadowa July 3. In the Franco-German war he commanded the third German army of 200,000 men and 500 guns; dispersed the French at Weissenburg 1870, Aug. 4; defeated the United army corps of Gens. MacMahon, Faily, and Canrobert at Wörth Aug. 6; in conjunction with Prince Frederick Charles successfully engaged the greater part of MacMahon's army near Sedan Sep. 1, made the difficult crossing of the Meuse river; entered Versailles Sep. 20; and invested Paris till the conclusion of peace. He was created field marshal of Prussia Oct. 28, and of Russia Nov. 8. In 1878 when Emperor William was wounded by Nobeling, F. was appointed regent during his father's recovery. He married Victoria Adelaide, Princess Royal of Great Britain, 1858, Jan. 25, by whom he had seven children. In the winter of 1886-7 he was seized with a throat affection which developed into a cancer and caused his death. Beside the eminent German physicians called to attend him, Dr. Morell Mackenzie, a London throat specialist, also was employed and given virtual charge of the case. His repeated denials of the existence of cancer created a painful jealousy among the German physicians and a strong feeling of German hostility against him. F. went to London 1887, June 13, and after an operation spent some time recuperating in Scotland. In Oct. Dr. Mackenzie acknowledged alarming symptoms, and with his patient went to San Remo, Italy. A new and lower growth was reported Nov., an apparent improvement marked Dec., but 1888, Feb. 8, tracheotomy had to be performed, and F. began growing rapidly weaker. Emperor William died Mar. 9, and on the following day F. started for Berlin to assume the crown. Despite the rapid progress of the disease, he applied himself to his public duties with much zeal till the early part of June. Two days before his death Dr. Mackenzie abandoned hope and acknowledged the presence of cancer. F. had for years had the respect of the civilized world as a man of noble private character, a superb military officer, a careful student of public affairs, a prince fervent in patriotism and hospitable to liberal ideas of government. His death was keenly felt by his nation and mourned throughout Europe. His short reign stands as a pathetic episode in German history, brightened by his unwavering fortitude. F. was succeeded by his son, William II., who entered upon his reign with all the martial spirit of the Hohenzollerns.

FREDERICK I., King of Denmark: 1473-1533 (reigned 1523-33). During the disturbed reign of his nephew Christian II., he behaved with so much circumspection, that the choice of the nation fell upon him when the king was deposed. He showed great cruelty to his unfortunate relative, whom he detained in close captivity; but he was a politic ruler. In 1527 he embraced the Lutheran faith, which he established in his dominions by most arbitrary measures.

FREDERICK III., King of Denmark: 1609-70 (reigned

FREDERICK V.—FREDERICK VI.

1648-70); son of Christian IV. The wars of his father's reign had brought the country into great embarrassment; and notwithstanding all his efforts to maintain peace, F. was continually embroiled in the quarrels of other nations, and during his reign Copenhagen was twice besieged by the Swedes under their warlike king Charles Gustavus; nor was peace re-established till after the death of Charles. The reign of F. was rendered memorable by the change in the governmental constitution, which, after having been in some degree elective, was at once changed into a hereditary and absolute monarchy by the voluntary act of the commons and clergy, who, from abhorrence of the nobility, surrendered to the crown the liberties and prerogative which they had hitherto enjoyed, and made, the sovereign absolute and irresponsible.

FREDERICK V., King of Denmark: 1723-66 (reigned 1746-66); son and successor of Christian VI. He was reputed one of the best and wisest monarchs of his time. Denmark owed to him the increase of her national wealth, and the establishment of various branches of commerce and manufacture. F. established a Greenland Company, opened the American colonial trade to all his subjects, founded the military acad. of Sorø, in Denmark, and caused schools to be opened at Bergen and Trondhjem, in Norway, for the instruction of the Laplanders. He established academies of painting and sculpture at Copenhagen, and sent a number of learned men—among whom was Niebuhr, father of the historian—to make explorations in the East.

FREDERICK VI., King of Denmark: 1768-1839, Dec. 3 (regent during his father's insanity 1784-1808, reigned 1808-39); son of Christian VII. and Caroline Matilda of England. In his reign, feudal serfdom was abolished, monopolies were abrogated, the criminal code was amended, and the slave-trade was prohibited earlier than in any other country. In 1800, Denmark joined the maritime confederation formed by Russia, Sweden, and Prussia, which led to retaliation on the part of England, to the seizure by that power of all Danish vessels in British ports, and to the despatch of a powerful fleet, under Sir Hyde Parker and Nelson, to give efficacy to the peremptory demand that the regent should withdraw from the convention. His refusal to accede to this demand was followed by a fierce naval engagement, in which the Danish fleet was almost wholly destroyed. A peace was concluded on the regent's withdrawal from the confederation; but in consequence of his persisting in neutrality, instead of combining with Great Britain against Napoleon, the war was renewed 1807 by the appearance, before Copenhagen, of a British fleet, bearing envoys, who summoned F. to enter into alliance with England, and to surrender his fleet and arsenals, and the castle of Cronborg, commanding the Sound. On his refusal, Copenhagen was bombarded for three days, the arsenals and docks destroyed, and all the shipping disabled, sunk, or carried to England. This blow paralyzed the national resources, and it required the exercise of much discretion on the part of the govern-

ment, and great endurance on that of the people, to prevent the irremediable ruin of the country. Smarting under the treatment which he had experienced from the English, the Danish monarch became the ally of Napoleon, and suffered proportionally after the overthrow of his empire. In 1814, Norway was taken from Denmark by the allies and given to Sweden. The state became bankrupt, and many years passed before order could be restored to the finances. Notwithstanding F.'s autocratic tendencies, he so far yielded to the movements of the times as to give his subjects, 1831, a representative council and a liberal constitution.

FREDERICK VII., King of Denmark: 1808-1863, Nov. 15 (reigned 1848-63); son and successor of Christian VIII. The principal events of his reign were the wars and diplomatic negotiations arising out of the revolt of the duchies of Holstein and Slesvig (q.v.), and the vexed question of the succession to Denmark Proper and the duchies on the death of the king and of his uncle the heir-presumptive, both of whom were childless. Notwithstanding the heavy expenses of the war, the material prosperity of the country increased during F.'s reign.

FREDERICK IV., Elector Palatine; 1574-1610 (ruled 1502-1610); son of Elector Louis VI. and Elizabeth of Hesse. He succeeded his father at the age of 9 years under the guardianship and regency of his uncle John Casimir, and on the death of the latter, 1592, took sole charge of the govt. The Protestant union of Germany was formed through his instrumentality 1601, and through his reign he heartily supported the Protestant cause. Many refugees of that faith sought an asylum and protection under his jurisdiction in Mannheim, and he raised that town to the rank of a city 1606.

FREDERICK V., Electoral Prince Palatine: 1596-1633 (ruled 1610-23; also King of Bohemia 1619-20). He married, 1613, Elizabeth, daughter of James VI. of Scotland and I. of England, through whose ambitious counsels he was induced to take a prominent part in the proceedings of the union of the Protestant princes of Germany, and finally, though against his own inclinations, to accept the title of king of Bohemia. His complete defeat at the battle of Prague terminated his short-lived enjoyment of the regal crown, of which he retained no other memorial but the mocking title of 'The Winter King.' Ridicule and contumely followed him wherever he went, and the rest of his life was spent in exile under the ban of the empire, and with no resources beyond those which he could obtain from the generosity of his friends. In 1623, he was declared to have forfeited his electoral title and his dominions in the Palatinate, which were conferred upon his cousin Maximilian of Bavaria, head of the Catholic league.

FREDERICK III., Elector and Duke of Saxony: 1463-1525 (ruled 1486-1525); son and successor of Duke Ernst (see ERNST, Elector and Duke of Saxony). He succeeded his father 1486, divided his Ernestine possessions with his brother, John the Constant, founded the Univ. of Wittenberg

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1502, promoted the Reformation, and was much attached to Melancthon and Luther; secreted the latter in Wartburg castle after his proscription in the Diet of Worms; made a pilgrimage to the Holy Land; was appointed imperial vicar three times, and on the death of Maximilian I. magnanimously refused the imperial crown and by his vote secured it for Charles V. He was succeeded by his brother John.

FREDERICK III., Elector of Brandenburg: see FREDERICK I., King of Prussia.

FREDERICK-CHARLES: 1828, Mar. 20—1885, June 15: Prus. prince: son of Prince Charles (brother of Emperor William I.). In his early youth, he manifested a great liking for warlike occupations; and the first Slesvig-Holstein war (1849) saw him in the field as captain, and not without honor to himself; in the campaign in Baden also he gathered laurels and honorable wounds; and in the second Slesvig-Holstein war his name became famous through the storm of the Düppel entrenchments. But his chief title to fame is from his part in the campaign of 1866 against Austria, where he commanded one of the invading armies, and where his able generalship contributed not a little to the final success of the war. He has indeed been blamed for excess of caution in advancing through Bohemia to the rendezvous at Gitschin, where his more prompt appearance, it is said, would have saved the Silesian army from the danger of serious disaster which it encountered in passing the defiles; but it may, in fairness, be assumed that the caution was necessary until the contrary is proved. Besides his services in the reorganization of the cavalry, he has written several military works of great merit. He commanded the second German army in the Franco-German war, and the investing forces when Metz capitulated, 1870, Oct. 27. and next day was made field-marshal by King William, afterward German emperor. F. C. was married to Marie Anna, Princess of Anhalt, 1854. In 1879, March, his third daughter, Louise Margaret, was married to the Duke of Connaught.

FREDERICK CITY, or FREDERICK: city, cap. Frederick co., Md.; on the Baltimore and Ohio railroad; 44 m. n. w. of Washington, 61 m. w. by r. of Baltimore, 3 m. from Monocacy battlefield, 12 m. from South Mountain battlefield. It is in a fertile valley, and contains 12 churches, 5 national banks (cap. \$675,000), 2 state banks (cap. \$286,437), state deaf and dumb institute, Frederick College (1797), 2 seminaries for girls, a Jesuit establishment, 3 foundries, 4 tanneries, 3 planing mills, several flouring mills, and sash, coach, brick, and iron factories. Francis S. Key, Chief Justice Roger B. Taney, and Barbara Fritchie are buried there. F. was occupied by the Confederate army under Gen. Lee, part of 1862, Sep., and by the Union army under Gen. McClellan remainder of month; and 1864, July 9, the Confederates under Gen. Early occupied it, collecting a levy of \$200,000 from its citizens. Pop. (1890) 8,193; (1900) 9,296.

FREDERICKSBURG: city of Spottsylvania co., Va.; on the s. bank of the Rappahannock river, 92 m. from its mouth; 13 m. s. of the Potomac river, 60 m. s. of Washing-

FREDERICKSBURG.

ton, 61 m. n. of Richmond; on the Richmond F. and Potomac, and the Potomac F. and Piedmont railroads. It is at the head of tide-water, and by the construction across the river of a dam, 900 ft. long and 18 ft. high, providing a fall of 48 ft. 2 in., has a valuable water-power. It contains 6 white and several colored churches, one national bank (cap. \$50,000), one private bank, 2 iron foundries, 3 flouring mills, tannery, and paper, woolen, machinery, and agricultural implement factories. It is noted for its brand of wheat flour, and the military operations there during the civil war. Pop. (1880) 5,010; (1890) 4,528; (1900) 5,068.

FREDERICKSBURG, BATTLE OF: in the war of secession, 1862, Dec. 13. After the battle of Antietam, 1862, Sep. 16-17, the Confederate army of Northern Virginia under Gen. Lee moved into the valley of the Rappahannock, while the army of the Potomac under Gen. McClellan remained passive till Oct. 26, when it began crossing the Potomac below Harper's Ferry and advancing s. toward Warrenton. The greater part of Lee's army moved parallel with McClellan's, and when the latter reached Warrenton (Nov. 7) Lee was at Culpepper, 20 m. s., while the remainder of the Confederate army under Gen. Jackson was at a distance of two days' hard marching. It is believed that McClellan purposed interposing his army between the separated wings of his opponents, attacking Lee before Jackson could come up, and then dashing toward Richmond. But there had been repeated delays in the movement of his force, and on the day of his arrival at Warrenton he was removed and superseded by Gen. Burnside. That officer deciding to move upon Richmond by the line of the Fredericksburg railroad, organized the army into three grand divisions, under Gens. Sumner, Hooker, and Franklin, and planned to cross the Rappahannock and occupy the heights back of Fredericksburg, Nov. 15. By the 19th the greater part of his army reached the river. Gen. Sumner, who reached Plymouth the 15th, wanted to cross and seize Fredericksburg at once, but Burnside would not consent till sufficient pontoons arrived to carry the whole army over. Through a delay never satisfactorily explained, the pontoons were not received from Washington till Dec. 10, and in the meantime Lee occupied the coveted heights and fortified them strongly. Dec. 11, 12 were occupied by the army of the Potomac in crossing the river. A part of the city was occupied, but no attempt to dislodge the Confederates from their stronghold on the heights was made till the following day. Then occurred one of the bloodiest and most reckless encounters of the whole war. The vicinity of Marye's Hill covered with Confederate batteries, and having a strongly fortified sunken road where the defenders were under complete protection against the Union fire, became a veritable valley of death. Charge after charge was made upon the Confederate works, till the veteran Hooker and other generals refused to sacrifice their men in the hopeless attempt to carry the heights. The battle raged from 10 A.M. till after sunset, and on the following day Burnside was persuaded with great difficulty to abandon his project for another attack. Both armies

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held their positions till the night of the 15th, when during a heavy storm the army of the Potomac recrossed the Rappahannock. Eight days later Gen. Burnside was removed from command. The army of the Potomac numbered about 100,000, had 32,000 in action, and lost 1,500 killed, 9,100 wounded, 2,078 missing; the Confederate army of Northern Virginia numbered about 80,000, had 25,000 in action, and lost 595 killed, 4,061 wounded, 563 missing.

FREDERICK-WILLIAM I., King of Prussia: 1688-1740 (reigned 1713-40): son and successor of Frederick I. of Prussia. In almost every particular he was the opposite of his father. He was simple, and almost penurious in his habits, attentive to business, passionately fond of military exercises, averse to mental cultivation, and fond of the society of the low and illiterate, while he carried to the utmost his ideas of arbitrary power and the divine right of kings. The public events of his reign were of little importance, although he was continually implicated in foreign wars, and he supported the cause of Stanislaus of Poland, and assisted Austria in her contests with France. By his economy and reforms in the finances, he was able to indulge his taste for the organization of military forces, while his childish love of tall soldiers induced him to connive at the most flagrant outrages both at home and abroad for kidnapping tall men and forcing them into his service: the result of this system was, that he left at his death a well-drilled army of 70 000 soldiers, of whom a large proportion were men of gigantic stature. What was of more consequence to his son and successor was, that his exchequer contained 9,000,000 thalers, and that his kingdom had attained an area of more than 45,000 sq. m., and a pop more than 2,240,000. See Morgenstern, *Ueber Friedrich Wilhelm I.* (Braunsch. 1793); F. Förster, *Gesch. Friedrich-Wilhelm's I.* (Pots. 1835); Carlyle, *Hist. of Friedrich II., called Frederick the Great.*

FREDERICK-WILLIAM II., King of Prussia: 1744-97 (reigned 1786-97); nephew of Frederick the Great. After a prolonged estrangement between his uncle and himself, he regained the good-will of the king by his valor in the war of the Bavarian succession 1778; but though he succeeded to a well-consolidated power and an overflowing treasury, he had not capacity to maintain his favorable position. Futile or hastily undertaken wars wasted his resources; so that at his death, instead of the overplus of 70,000,000 thalers that had been bequeathed to him, the state was hampered with a debt of 22,000,000. His predilection for unworthy favorites, the establishment of a strict censorship of the press, and the introduction of stringent ecclesiastical enactments, alienated the people from him, though his natural mildness of disposition had excited the sanguine hopes of the nation on his accession. F.-W. shared in the second partition of Poland, 1793, and thus gained considerable addition to his kingdom, which by purchase, inheritance, and other means, was augmented during his reign by the acquisition of more than 46,000 sq. m. of territory, and

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2½ millions of inhabitants. The chief internal improvements in this reign were the introduction of a new code of laws, and a less onerous mode of raising the taxes.

FREDERICK-WILLIAM, III., King of Prussia: 1770–1840 (reigned 1797–1840); son and successor of Frederick-William II. He early took part in the administration, and on his accession at once dismissed the unworthy favorites of the preceding reign, and accompanied by his beautiful young queen, Louisa of Mecklenburg-Strelitz, made a tour of inspection through the numerous provinces of his kingdom, with a view of investigating their condition, and contributing to their local and general improvement. But though F.-W. was well intentioned, and in his moral and domestic relations exemplary, he lacked the dignity and force of will to cope with the difficulties of his position. By his efforts to maintain neutrality in the great European struggle that had been excited by the wars and victories of the French, he awakened the distrust of all the great anti-Gallican powers of Europe, and disappointed the petty German princes, who had looked upon Prussia as their protectress against foreign encroachments. Napoleon's promises of support and friendly intentions soon changed this neutrality to an alliance with France, and for some time Prussia persevered in her dishonorable and self-seeking policy, which was rewarded by the acquisition of Hildesheim, Paderborn and Münster, which added nearly 4,000 sq. m. of territory, and half a million of inhabitants to the kingdom; but at length the repeated and systematic insults of Napoleon, who despised F.-W., while he professed to treat him as a friend, roused the spirit of the nation, and the king saw himself obliged, 1805, to agree to a convention with Russia, the real object of which was to drive Napoleon out of Germany. Again the treachery of Prussia led her to make a new treaty with France, by which she consented to receive the electorate of Hanover, and thus involved herself in a war with England. The insults of Napoleon were redoubled after this fresh proof of F.-W.'s indecision. The Prussian nation, headed by the queen, now called loudly for war, and at the close of 1806, the king yielded to these appeals. Hostilities began without further delay; but the defeat of the Prussians at Jena, Eylau, and Friedland, compelled their unfortunate monarch to sue for peace. The Prussian army was annihilated and the whole of the kingdom, with the exception of a few fortified places remained in the power of the French. By the intervention of Emperor Alexander of Russia, a peace was concluded, known as the Treaty of Tilsit, by which F.-W. lost the greater part of his realm, and was deprived of all but the semblance of royalty; but though for the next five years he was a mere tool in the hands of Napoleon, who seized every opportunity of humbling and irritating him, his spirit was not subdued, and his unremitting efforts at this period of his life to reorganize his enfeebled government by self-sacrifices of every kind, endeared him greatly to his people. The disastrous termination of Napoleon's Russian campaign was the turning point in the fortunes of Prussia; for though

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the French emperor was victorious over the Prussians and Russians in the battles of Lützen and Bautzen, which were fought soon after the declaration of war (1813) which F.-W. had made against France to the great joy of his people, the allies were soon able to renew hostilities, which were carried on with signal success, until they culminated in the great battle of Leipsic, in which the Prussians, under their general, Blücher, earned the greatest share of glory. The peace of Vienna restored to Prussia almost all her former possessions, while the part taken by the Prussian army under Blücher in gaining the victory of Waterloo, by which Napoleon's power was finally broken, raised the kingdom from its abasement. From that time, F.-W. applied himself to the improvement of his exhausted states; but though before the French revolution of 1830 Prussia had recovered her former material prosperity at home and political consideration abroad, the king adhered too strictly to the old German ideas of absolutism, to grant his people more than the smallest possible amount of political liberty. He had indeed promised to establish a representative constitution for the whole kingdom, but this promise he wholly repudiated when reminded of it, and merely established the *Landstände*, or Provincial Estates, a local institution, devoid of all effective power. His support of the Russian govt. in its sanguinary methods of crushing revolutionary tendencies in Poland, showed his absolutist tendencies, and his dread of liberal principles. F.-W. was more than once embroiled with the pope, on account of his violation of the concordat. He concluded the great German commercial league known as the *Zollverein* (see GERMANY), which organized the German customs and duties in accordance with one uniform system.

FREDERICK-WILLIAM IV., King of Prussia: 1795, Oct. 15—1861 (reigned 1840, June 7—1858); son and successor of Frederick-William III. He was carefully educated, fond of the society of learned men, and a liberal patron of art and literature. He showed much of his father's vacillation of purpose; and though he began his reign by granting minor reforms, and promising radical changes of a liberal character, he always, on one plea or other, evaded the fulfilment of these pledges. He was possessed by high but vague ideas of 'the Christian state,' and showed through life a strong tendency to mystic pietism. The one idea to which he adhered with constancy was that of a union of all Germany into one great body, of which he offered himself to be the guide and head. He encouraged the duchies of Holstein and Slesvig in their insurrectionary movement, and sent troop to assist them against Denmark; but he soon abandoned their cause, and being displeased with the revolutionary character of the Frankfurt Diet, refused to accept the imperial crown which it offered him. The conspiracies in Prussian Poland were suppressed with much rigor; and the popular movement which followed the French revolution of 1848, was met by the king at first with resolute opposition; but when the people persisted in demanding the removal of the troops

from the capital, and enforced their demand by storming the arsenal, and seizing on the palace of the Prince of Prussia (afterward Emperor William I.), who was at that time especially obnoxious to the liberals, he was compelled to comply with their wishes. Constituent assemblies were convoked only to be dissolved when the king recovered his former security of power, and new constitutions were framed and sworn to, and finally modified or withdrawn. After the complete termination of the revolution in Germany, the revolutionary members of the Assembly of 1848 were prosecuted and treated with severity. the obnoxious 'pietistic' party and the nobility were reinstated in their former influence at court, and the freedom of the press and of religious and political opinion, was strictly circumscribed. The life of the king was twice attempted; first 1847 by a dismissed burgomaster, named Tschetch; secondly 1850, by an insane discharged soldier of the name of Sefeloge. In 1857, F.-W. was seized with remittent attacks of insanity; and in 1858 he resigned all management of public affairs to his brother and next heir, who acted as regent of the kingdom till his own accession 1860, as William I.

FREDERICK-WILLIAM, Elector of Brandenburg ('the Great Elector'); 1620-88 (ruled 1640-88). On his accession, he found an empty exchequer, the towns and cities depopulated, and the whole electorate devastated by the ravages of the Swedish and Imperialist armies during the 'Thirty Years' War, which was not yet concluded; while a portion of his inheritance had even been confiscated by the Swedes. His first acts were to regulate the finances, and to conclude a treaty of neutrality with Sweden, which gave him leisure for the organization of his army, and the re-peopling of the deserted towns and villages by immigration. By the treaty of Westphalia, through which he lost several important places, he recovered the eastern portions of Pomerania, Hohenstein, the bishoprics of Halberstadt, Minden, and Kamin, as lay-principalities, and the reversion of the archbishopric of Magdeburg. In the course of ten years he had, by the help of his generals, Derfflinger, Schomberg, and Kannenberg created an army of 25,000 men, organized on the Swedish model; and having been constrained to enter into an alliance with Charles X., he co-operated with him in the taking of Warsaw, effected at the cost of a most sanguinary engagement 1656. In return for this co-operation, F.-W. secured the emancipation of his Prussian duchy from its former dependence on Poland. The aggressions of Louis XIV. on the Rhenish frontier alarmed the elector, who induced the emperor, the king of Denmark, and the elector of Hesse-Cassel, to enter into a league against France. The result was unfavorable to the cause of the German princes, and F.-W. was obliged to content himself with making highly disadvantageous terms. The war was soon renewed, and Brandenburg was again a prey to the incursions of the Swedes, who, at the instigation of Louis, advanced upon Berlin, laying waste everything on their march. The elector, who had taken up his winter-quarters in Franconia, hurried across the Elbe at the head of his cavalry, and having signally defeated the Swedes, drove them from his

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dominions. If the emperor had been true to his word, and supported him, F.-W. might have made head against the French; but being forsaken by the other German princes, and his dominions overrun by the troops of Louis, he was obliged to agree to the treaty of St. Germain, by which he restored all his conquests to the Swedes, in return for the withdrawal of the French army, and the payment to him of an indemnity of 300,000 crowns. From this time forth, F.-W. applied himself to the task of consolidating the prosperity of his dominions. During his reign, he more than tripled the area of his territories, and by his generous reception of 20,000 French Protestants after the revocation of the Edict of Nantes, and the encouragement which he afforded to the immigration of Dutchmen and other foreigners, he augmented the population of his states, and introduced numerous industrial arts among his subjects. He founded the university at Duisburg, and the royal library at Berlin, and reorganized the universities of Frankfurt-on-the-Oder, and Königsberg, opened canals, established a system of posts, and greatly enlarged and beautified Berlin. He left a well filled exchequer and a highly organized army. See Orlich, *Gesch. des Preuss. Staats im 17 Jahrh.*

FREDERICK-WILLIAM, Duke of Brunswick: 1771-1815, June 16. He entered the Prussian service at an early age, and was actively engaged with the army during the war with France 1792, and again 1806, and was taken prisoner with Blücher at Leipsic. He was prevented by the veto of Napoleon from acceding to the dukedom, Being resolved to take part in the war against the French, he raised a free corps in Bohemia, and threw himself into Saxony, which he was, however, speedily compelled to evacuate. After the total defeat of the Austrians 1809, the duke determined to leave Germany; and with his corps of 700 'black hussars,' and 800 infantry. he began his masterly retreat. After various skirmishes, in one of which he defeated the Westphalian commander Wellingerode and a picked detachment of troops, he reached Brunswick, in the neighborhood of which he gained a victory at Oelper over 4,000 Westphalians, commanded by General Reupel. He next crossed the Weser, and having reached Elsfleth, and taken possession of a sufficient number of vessels and seamen, he embarked his troops; and finally, after stopping at Heligoland, landed in England with his men 1809. Aug. He was received with enthusiasm; and having entered the English service with his men, took part in the Peninsular war, where he served with distinction, receiving from the British government an allowance of £6,000 a year, which he retained till his return to his own dominions 1813. Although no prince could be more earnestly bent on securing the welfare of his subjects, his efforts failed utterly from the untimely and injudicious nature of the reforms he endeavored to effect; while the magnitude of his military establishments, which were quite unsuited to the limited extent of his territories, excited the ill-will of his people. He joined the allied army with his hussars after the return of Napoleon from Elba, and fell while valorously leading his men at Quatre Bras.

FREDERICTON—FREE.

FREDERICTON, *frĕd'ĕr-ĭk-ton*: city and port of entry, capital of the province of New Brunswick, Canada; on the right bank of the St. John river, 56 m. n.w. of the port of St. John. The river is navigable to F., 84 m. from the Bay of Fundy, for large vessels, and for small vessels abt. 60 m. further. Besides fine public buildings, F. contains the Univ. of New Brunswick, well endowed; also a cathedral of the English Church. The F. and New Brunswick railway terminates here. The place, called at first St. Ann's, founded by Sir Guy Carleton 1786. Pop. (1901) 7,117.

FREDERIKSBORG: *frĕd'ĕr-ĭks-borĕh*: royal palace on the island of Seeland, 22 m. n.n.w. of Copenhagen, Denmark; built by Christian IV. 1606–20. It is of red brick in the Gothic style of architecture, and contains a knights' hall with a richly carved, gilded, and painted ceiling, and a chapel, with ebony and silver pulpit and altar, in which all modern kings of Denmark have been crowned. It has also a notable gallery of portraits of royal and noble persons.

FREDERIKSHALD, *frĕd'ĕr-ĭks-hĕld*: fortified seaport of Norway, dpt. (amt) of Smalenen, on an inlet called Swinesund, near the Swedish border, about 60 m. s.s.e. of Christiania. It is beautifully situated, and is a neat, well-built town, with several handsome edifices. Its harbor is excellent, accommodating the largest vessels. F. largely exports deals and lobsters. S.e. of the town stands the fortress of Frederiksteen, on a perpendicular rock 400 ft. high; often assaulted, but never yet taken. While laying siege to Frederiksteen, Charles XII. of Sweden was killed, 1718; in commemoration of which event an obelisk was raised 1814 on the spot where he fell. Pop. (1891) 11,237.

FREDERIKSTAD: *frĕd'ĕr-ĭk-stĕd*: fortified seaport of Norway, prov. of Christiania, at the mouth of the Glommen river; 48 m. s.e. of Christiania city. It has a commodious and safe harbor, large shipping trade, and manufactories of pottery, hardware, agricultural implements, tiles, and brandy. It was founded by Frederick the Great 1657, was strongly fortified, and was besieged in vain by Charles XII. of Sweden 1716. Pop. (1891) 12,307.

FREE, a. *frĕ* [AS. *freo*; Icel. *fri*; Goth. *frija*, free—*lit.*, acting at pleasure]: being at liberty; not under restraint; enjoying civil rights; allowed or permitted; not encumbered; open; unreserved; exempt from; liberal; gratuitous; licentious; in *OE.*, ready; eager: V. to set at liberty; to rescue; to release; to remove obstruction or encumbrance from; to clear from. **FREE'ING**, imp. **FREED**, pp. delivered from restraint; cleared. **FREE'LY**, ad. *-lĭ*, in a free manner; liberally; generously; without necessity. **FREE'NESS**, n. state of being unconstrained; frankness; openness. **FREE-AGENCY**, the state of acting freely or without necessity. **FREE-AGENT**, one under no constraint of will. **FREE-BOOTER**, *-bĕt-ĕr* [*free*, and *booty*: *OE freebutter*: Ger. *frei-beuter*]: a robber; one who roves about for plunder or booty; one who without actual national war appropriates as booty whatever he can lay his hands on in any country; a name especially applied to the buccaneers infesting the coasts of America in the 16th and 17th c., corrupted by the

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F. into *fibustiers*, and by Sp. into *filibusters*, which latter is the modern term for 'American piratical adventurers,' whose field of operations is principally the W. Indies, and Central and S. America: see **FILIBUSTER**. **FREE'BOOTING**, plundering; pillaging. **FREE-BORN**, a. free by birth; inheriting liberty. **FREED'MAN**, n. a slave set at liberty by law. **FREEDOM**, n. *dūm* [AS. *freodom*]: liberty; independence; particular privilege; ease of doing anything; familiarity. **FREEDOM OF THE PRESS**: see **PRESS**. **FREE-HEARTED**, a. open; frank; liberal; generous. **FREE'HOLD**, property which a man holds for life or in his own right; fee-simple (see below). **FREE'HOLDER**, one who possesses a freehold. **FREE-LANCES**, roving companies of knights and soldiers, after the Crusades, who wandered from state to state, selling their services to any lord who could pay for their aid in the perpetual feuds of the middle ages: known in Italy as *Condottieri* (q. v.). **FREE'MAN**, one who possesses liberty, or particular privileges (see below). **FREEMA'SON**, *mā'sn*, formerly, one of an ancient fraternity of operative masons; now, a member of a secret society professedly and in intention founded on moral virtue, but generally a mere social and benevolent association. **FREE'MA'SONRY**, n. *-mā'sn-rī*, the principles of the society of freemasons (see **MASONS**, **FREE**). **FREE-MINDED**, free from care. **FREE-SCHOOL**, a school free from the payment of fees; a school open to all. **FREE-SPOKEN**, speaking without reserve or restraint. **FREESTONE**, variety of sandstone easily cut or wrought (see below). **FREE-THINKER**, one who forms his opinions from his studies and researches; a skeptic. **FREE-TRADE**, trade or commerce without undue restrictions (see below). **FREE-WILL**, n. liberty of choice; power to direct actions (see below): **ADJ.** spontaneous. **FREE AND EASY**, making one's self at home; without formality. **TO MAKE FREE**, to take undue liberties. **FREEHAND DRAWING**, ordinary drawing and sketching, as distinguished from mechanical and geometrical drawing with instruments.—**SYN.** of 'free, a.': permitted; allowed; unrestrained; ingenuous; frank; generous; clear; guiltless; innocent; exempt; enfranchised; ready; eager; independent; voluntary; spontaneous; willing; abundant;—of 'free, v.': to loose; liberate; banish; frank.

FREE' BENCH (*Francus Bancus*): in the ancient legal custom of certain manors in England, a widow's right of dower out of the lands held by her husband in *Socage* (q. v.): see also **DOWER**. A widow who has forfeited her F. B. is, by the custom of some manors, permitted to recover her right.

FREE CHURCH OF ENGLAND: an Episcopal Ch. founded in England 1844; in origin, aims, and spirit closely resembling the Reformed Episcopal Church (see **EPISCOPAL CHURCH**, **REFORMED**). It also agrees with the general sentiments of the 'evangelical party' in the Anglican Church. It arose in opposition to the Tractarian movement (see **TRACTARIANISM**: **RITUALISM**), and seeks to develop the principles of the Protestant reformation in their fulness. It favors evangelistic effort. The body is small in numbers.

FREE CHURCH OF SCOTLAND.

FREE CHURCH OF SCOTLAND: a Presbyterian organization of those who at the 'Disruption' of the Established Church of Scotland, 1843, withdrew from connection with the state, and formed themselves into a distinct religious community, at the same time claiming to represent the historic church of Scotland, as maintaining the principles for which it has contended since the Reformation.

There is no difference between the F. C. of S. and the Established Church in the standards which they receive; and all the laws of the church existing and in force prior to the Disruption, are acknowledged as still binding in the one as much as in the other, except so far as they may since have been repealed. The same Presbyterian constitution subsists in both churches, with the same classes of office-bearers and gradations of church-courts. The F. C., indeed, professes to maintain this constitution and church government in a perfection impossible in the present circumstances of the Established Church, because of acts of parliament by which the Established Church is trammelled, and interventions of civil authority to which it is liable. And the whole difference between the F. C. and the Established Church relates to the consent and submission of the Established Church to this control of the civil power in things which the F. C. regards as belonging not to the province of civil government, but to the church of Christ and to its office-bearers and courts as deriving authority from Him; so that the controversy is often described as respecting the *Headship of Christ* or the *Kingdom of Christ*, though in terms this doctrine is fully professed by both churches. The question does not directly relate to *Voluntaryism* (q v.). Those who constituted the F. C. of S. in 1843, firmly believed that the church might be connected with the state, and receive countenance and support from it, to the advantage of both; while they maintained that there must not, for the sake of any apparent benefits flowing from such connection, be any sacrifice of the independence or self-government of the church, as the kingdom of Christ, deriving its existence, organization, and laws from Him. Nor has any change of opinion on this subject been manifested.

The Westminster Confession of Faith asserts 'that there is no other head of the church but the Lord Jesus Christ;' and that 'the Lord Jesus, as King and Head of his church, hath therein appointed a government in the hand of church-officers, distinct from the civil magistrate;' it ascribes to these church-officers the right of meeting in 'synods or councils,' which it affirms to be 'an ordinance of God;' and represents the exercise of church discipline as intrusted to them as well as the ministry of the word and sacraments. It ascribes to the civil magistrate much power and many duties concerning things spiritual, but no power in or over these things themselves. And all this was equally the doctrine of the Church of Scotland before the Westminster Confession was compiled. The support which, in many parts of Europe, princes gave to the cause of the Reformation, and the circumstance that states as well as churches were shaking off the fetters of Rome, led in

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many cases to a confounding of the civil and the spiritual. The Church of Scotland accomplished its emancipation from Rome, not with the co-operation of the civil power, but in spite of its resistance; and after the Reformation, the Scottish Reformers and their successors were compelled to a closer study of their principles, by the continued attempts of the civil rulers to assume authority over all the internal affairs of the church. But amid their struggles, the Presbyterians of Scotland so far prevailed as to obtain at different times important acts of parliament in recognition of their principles, and 'ratification of the liberty of the true kirk;' and finally, after the Revolution of 1688, an act ratifying the Westminster Confession of Faith itself, and incorporating with the statute law of the realm all its statements concerning the province of church-judicatories and that of the civil magistrate, and the bounds of their respective powers.

The rights and privileges of the Presb. Church of Scotland, guaranteed by the Revolution settlement, were expressly secured by the Treaty of Union, and jealously reserved from the power of the British parliament; yet within five years afterward when Jacobite counsels prevailed in the court of Queen Anne, an act was passed for the restoration of patronage in Scotland, with the design of advancing the Jacobite interest by rendering ministers more dependent on the aristocracy, and less strenuous advocates of the most liberal principles then known. This act soon became the cause of strife within the Church of Scotland, and of separation from it; effects which have continually increased to the present day. That the church at first earnestly protested against the act; that this protest gradually became formal, and was at last relinquished; that the church-courts themselves became most active in carrying out the settlement of presentees, notwithstanding all opposition of congregations—these are points to which it is enough here to allude. It is important, however, to observe that in all the enforcement of the rights given to patrons by the act of 1712, during the 18th c., and considerable part of the 19th, no direct invasion of the ecclesiastical province took place on the part of civil courts or of the civil power; the presentation by the patron was regarded as conveying a civil right at most to the benefice or emoluments only, while the church-courts proceeded without restraint in the induction of ministers, and a few instances it happened that the benefice and the pastoral office were disconnected by the opposite decisions of the civil and ecclesiastical courts. And even the 'forced settlements,' in which the fullest effect was given by the church-courts to the will of patrons, were accomplished according to the ancient form, upon the *call* of the parishioners, inviting the presentee to be their minister, although the *call* was a mere form—in the words of Dr. Chalmers, 'the expressed consent of a few, and these often the mere dribblet of a parish.'

When the 'Moderate' party, long dominant in the general assembly of the Church of Scotland, became

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again the minority 1834, the accession of the 'Evangelical' party to power was at once signalized by an attempt to restore the *call* to efficacy. This was done by the famous *Veto Law*, by which it was declared 'that it is a fundamental law of this church that no pastor shall be intruded on any congregation contrary to the will of the people;' and enacted, in order to give effect to this principle, that a solemn dissent of a majority of male heads of families, members of the vacant congregation, and in full communion with the church, shall be deemed sufficient ground for the rejection of the presentee. The Veto Law thus determined rather how strong an expression of dissent by the parishioners should be requisite to invalidate a call, than how strong an expression of assent should be requisite to give it validity; a point afterward turned to account in controversy; as if the *veto* were a new and unconstitutional principle introduced; though it was certainly adopted as the least extreme mode of giving effect to the old principle which the law declared.

The same general assembly by which the Veto Act was passed, is memorable for the assertion of the constitutional principles and inherent powers of the church in another important particular, the admission of the ministers of 'chapels of ease' to the same ecclesiastical status with the ministers of endowed parishes, in consequence of which they became members of church-courts, and had districts assigned to them *quoad sacra*, with the full parochial organization.

The Veto Act was soon the subject of litigation in the court of session. A conflict arose which in various forms agitated the whole of Scotland, and which, ere long, related as much to the status of chapel ministers as to the rights of presentees to parishes; and indeed involved the whole question of the relations of civil and ecclesiastical powers, at least as far as the Established Church was concerned. The first case carried into the civil court was that of a presentation to Auchterarder, in which the call to the presentee was signed by only two parishioners, while almost all who were entitled to do so according to the Veto Act, came forward to declare their dissent. The decision of the court of session, which, upon an appeal, was affirmed by the house of lords, was to the effect, that the rejection of the presentee on the ground of this dissent was illegal; the opinions of the judges in the Scottish court was indeed divided; but those in accordance with which the judgment was pronounced, asserted the right of the civil courts to review and control all proceedings of church-courts, a power whose exercise was speedily attempted in other cases, to the extent of requiring presbyteries to proceed to the settlement of qualified presentees without respect to the opposition of congregations; interdicting the admission of ministers to pastoral charges even when no question of emoluments was involved; interdicting the *quoad sacra* division of parishes or any innovation on the existing state of a parish as to pastoral superintendence and the jurisdiction and discipline of the kirk-session; interdicting church-

FREE CHURCH OF SCOTLAND.

courts from pronouncing ecclesiastical censures, and suspending or revoking them when pronounced; interdicting ministers from preaching the gospel and from administering the sacraments within certain parishes; determining who should and who should not be deemed entitled to sit and vote in general assemblies and other courts of the church; and other such measures, wholly subversive of the independence of the church, and reducing it, if acquiesced in, to the condition of 'a creature of the state.' They were not, however, acquiesced in; and though in one instance ministers were brought to the bar of the court of session, and reproved for disregarding its authority, their protest against its claim to authority was maintained even there; and in the far greater number of instances, its interdicts were broken without any attempt being made to call those who did so to account. It is impossible here to enter into the details of this struggle, which was brought to a final issued by the judgment of the house of lords 1842, Aug., affirming a decree of the court of session, which required the presbytery of Auchterarder to take the ordinary steps toward the settlement of the presentee to Auchterarder, without regard to the dissent of the parishioners. The law of the land being thus decided by the supreme court to be such as they could not with good conscience comply with, and parliament having rejected an application, in the form of a 'Claim of Right,' for an act such as would have reconciled the duties of their position according to the law of the land, in the church by law established, with what they believed to be their duty toward Christ and according to his law; it now seemed to the greater number of the ministers and elders holding the principle of the independence of the church, that the only course open to them was to retire from their position by the sacrifice of the emoluments and benefits of an establishment. And this they did at the meeting of the general assembly 1843, May 18. Headed by Dr. Chalmers, Dr. Welsh, and others of the most eminent in the church, they left the appointed place of meeting of the general assembly, St. Andrew's Church, Edinburgh, and proceeded to another place, previously prepared, Tanfield Hall, Canonmills, where, in the midst of a great concourse of people, the first general assembly of the F. C. of S. was immediately constituted, and Dr. Chalmers was unanimously called to the chair as its moderator. 474 ministers renounced their connection with the Establishment, and with them a great body of its elders and members.

Immediate steps were taken for completing the organization of the F. C., and extending it as much as possible into every district of Scotland. The forethought of Dr. Chalmers had already devised the SUSTENTATION FUND (q.v.). The F. C. undertook from the first the continued support of all the missions previously carried on by the Church of Scotland; and all the missionaries hastened to declare their adherence to the Free Church. An 'education scheme' was soon undertaken; and *colleges* for the training of ministers were founded in Edinburgh, Glasgow,

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and Aberdeen. Considerable opposition was at first shown by landowners, who refused to grant sites for churches and other buildings; but this gradually gave way. The bitterness of feeling which at first existed between the Established Church of Scotland and the F. C. has long since very much passed away.

The number of ministerial charges in the F. C. of S. (1881) was slightly above 1,140. There are also numerous 'preaching stations,' in which preaching is regularly maintained, and other ordinances are administered under the care of presbyteries. Some from these are continually being added to the list of ministerial charges. The whole sum raised for religious and educational purposes by the F. C. of S. to 1891, Mar. (abt. 44 years) was about \$95,000, - 000 or rather more than \$2,273,850 a year. In this are included the sums applied to the erection of churches, manse, school-buildings, colleges, etc. The Sustentation Fund now allows an 'equal dividend' of £160 to the ministers, with an addition of £30 or £15 in certain cases. The total sum raised 1890-1 was £653,694.

Since 1843, the history of the F. C. has been generally that of peaceful progress. It has been agitated by questions respecting the administration of the Sustentation Fund, colleges, etc., of little interest to those beyond its own pale. It was brought into a litigation in the court of session, seeming to affect its fundamental principles. The minister of the F. C. at Cardross, in Dumbartonshire, having been suspended by the general assembly of 1858, had recourse to the court of session, on the alleged ground of irregularity in the proceedings of the ecclesiastical judicatories, demanding the suspension of the sentence; and being on this account summarily deposed by the general assembly, he raised an action in the court of session, not only claiming damages, but to have the sentence rescinded and found null and void. The case terminated in a recognition of the independence of the church in things purely spiritual, and a full admission of its subjection to the civil courts in all things temporal, including the right of these courts to demand full information as to all ecclesiastical proceedings, and production of minutes and other documents, when they should see cause. Negotiations toward union with the United Presbyterian Church gave rise to great dissension in the F. C., and it seemed as if its disruption was impending, but in 1900 the F. C. of S. and the United Presbyterian church of Scotland merged their interests and formed the United Free church of Scotland. The new organization had 1,664 congregations; 1,795 ordained ministers; 495,259 members, besides 94,460 adherents; 2,364 Sunday schools, with 28,289 teachers and 334,228 scholars; and annual free-will offerings exceeding \$5,000,000. The denominational courts are the general assembly, 11 synods and 64 presbyteries.

FREE' CITIES: those German towns, Hamburg, Bremen, Lübeck, and Frankfurt-on-the-Main, which were of themselves sovereign states and members of the German confederation. They are remnants of the once numerous 'Imperial' cities, or cities not subject to any superior lord,

FREEDMEN'S BUREAU—FREEHOLD.

out immediately under the empire. Of the four F. C., the last remaining was Hamburg; and 1888, Oct. 16. Hamburg joined the German customs-union; yet retaining several rights which the other free cities had surrendered.—Frankfurt (q.v.) was annexed to Prussia 1866.

FREEDMEN'S BUREAU: organization created by act of congress 1865, Mar. 3, and attached to the war dept. 'for the supervision and management of abandoned lands and the control of all subjects relating to refugees and freedmen from any district of the country within the territory embraced in the operations of the army.' Gen. Oliver O. Howard was appointed commissioner 1865, May 12, and was provided with a number of assistants either appointed or detailed from the army. The dist. assigned each asst. commissioner was sub-divided and placed under the control of sub-asst. commissioners, and in addition a supt. of education was appointed for each state within the jurisdiction of the bureau. To facilitate the large and complex work devolved on the bureau, adjutant's, quartermaster's, special commissary, land and claims, transportation, bounty, and school divisions were created, and each placed in charge of a competent officer. A supplementary bill, passed 1866, Feb. 6, was vetoed by Pres. Johnson as unconstitutional, and failed to pass over the veto. Another, passed 1866, July, continued the bureau two years, was vetoed and passed over veto. In 1868, June, the bureau was continued by law one year longer in unreconstructed states; 1868, Aug., it was provided that the bureau should be withdrawn from the various states 1869, Jan. 1, except as to its educational work, which did not stop till 1870, July 1; the collection of pay and bounties for colored soldiers and sailors was continued by the bureau till 1872, when its functions were assumed by the war department. The total expenditures of the F. B. 1865, Mar.—1870, Aug. 30, were \$15,359,092.

FREEHOLD, ESTATE OF (*liberum tenementum*, frank tenement): any estate of inheritance, or for life, in real property, whether a corporeal or incorporeal hereditament. This, which accords with Chancellor Kent's definition, somewhat extends the usage in English law.—In England, by freehold property is meant all estates which owe no duty or service to any lord but the king. What are now known as estates of freehold were, under the feudal system, denominated frank tenements. They were held by the honorable tenure of Knight's Service (q.v.) and Free Socage (q.v.), and might have been held either of the crown or of a subject. But the statute of *Quia emptores* having abolished subinfeudation, all freehold estates, except those held of subjects since the time of Edward I., are now held of the crown. A freehold estate must be an estate in fee, in tail, or for life; all other estates in land, as estates for years, are called chattel interests (see also **COPYHOLD**). An estate of freehold could in general be created only by livery of sasine or Feoffment (q.v.). By the doctrine of the feudal law, no person who had an estate of less duration than for his own life or for the life of an-

'FREEHOLD LAND SCHEME—FREEMAN.

other man, was considered a freeholder; and none but a freeholder was considered to have possession of the land. A tenant for years, etc., was regarded as holding possession for the freeholder. By 8 Hen. VI. c. 7, the famous statute was passed which still in great measure regulates the county elections, and enacts that no freeholder shall vote whose freehold is not of the value of at least 40s a year. By 2 Will. IV. c. 45, s. 18, this qualification is continued as to all freeholds of inheritance, and to freeholders for life in actual occupation, or who have acquired their lands by marriage, marriage settlement, devise, or promotion to any benefice or office.

Freehold estates are recognized in American law and the essential characteristics of the English Common Law, modified by changes of situation and place, continue, except in the matter of alienage. Under the English common law, aliens could purchase lands and hold them as against all the world except the state. They could be deprived of their lands by the state through a technical proceeding known as 'office found.' But aliens could not take lands by descent nor transmit them to others as their heirs. The disabilities of aliens in respect to the holding and transmission of estates, have under statutes, ranging in the different states, been very largely removed.

FREEHOLD LAND SCHEME: a plan in Britain to enable mechanics, artisans, and other working persons, to purchase a piece of freehold land, of such yearly value as to entitle the owner to the elective franchise. Irrespective of any political object, benefit building societies now exist in most of the chief British towns: see **BENEFIT SOCIETIES**.

FREEMAN, ALICE ELVIRA, PH.D.: see **PALMER, ALICE ELVIRA, PH.D.**

FREEMAN, EDWARD AUGUSTUS, D.C.L., LL.D.: 1823, Aug. 2—1892, Mar. 16; b. Harborne, Staffordshire, England: historian. He was elected a scholar of Trinity College, Oxford, 1841, fellow 1845, and honorary fellow 1880; was examiner in the School of Law and Modern History 1857-8 and 1863-4, and in the School of Modern History 1873; Rede lecturer at Cambridge 1872; and Regius prof. of modern history and fellow of Oriel College, Oxford, from 1884 till his death. He made a single attempt to enter political life, 1868, when he was defeated for parliament. He was created honorary D.C.L. by the Univ. of Oxford 1870, honorary LL.D. by the Univ. of Cambridge 1874 and by the Univ. of Edinburgh 1884, and honorary member of the Imperial Univ. of St. Petersburg 1877. He was a knight commander of the order of the Redeemer of Greece, of the order of Danilo of Montenegro, and of the order of Takova of Servia. He was also knight of the second class of the order of St. Saba, corresponding member of the Imperial Academy of Sciences of St. Petersburg, of the Royal Academies of Lincei of Rome, of Munich, Copenhagen, and Belgrade; of the historical societies of Massachusetts, Maryland, Pennsylvania, etc., of the Greek

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Historical and Ethnological Society, and of the Genevese Institute of Sciences, Letters, and Fine Arts. He was a popular lecturer, but was most widely known for his voluminous writings on historical, political, and architectural subjects. By many critics his *History of the Norman Conquest* (5 vols., 1867-76) is considered his greatest work as well as one of the greatest monuments of British historical learning. His other works include *A History of Architecture* (1849); *History and Conquests of the Saracens* (1856); *Historical and Architectural Sketches*, chiefly Italian (1876); *The Ottoman Power in Europe* (1877); *Historical Geography of Europe* (2 vols. 1881); *The Reign of William Rufus, and the Accession of Henry I.* (2 vols. 1882); *Some Impressions of the United States. English Towns and Districts*, and *Lectures to American Audiences* (1883); *The English People in its Three Homes* (1884); *The Practical Bearings of General European History* (1884); *Methods of Historical Study* (1885); *Chief Periods of European History* (1886); *Greater Greece and Greater Britain* and *George Washington* (1888); *The History of Sicily from the Earliest Times* (1891-2); and a fourth series of *Historical Essays* (1892). F. was the leader of what has been called the Teutonic school in English history.

FREE'MAN, JAMES, D.D.: 1759, Apr. 22—1835, Nov. 14; b. Charlestown, Mass.: Unit. minister. He graduated at Harvard College 1777, was a milit. prisoner in Quebec 1780-82, became lay-reader in King's Chapel, Boston, 1782, became a Unit., induced the Episc. soc. of the church to change its prayer-book to harmonize with his new theological ideas, and was consecrated pastor of the church by his people on the refusal of the Episc. bp. to officiate. He was the first minister in the United States to acknowledge himself a Unit., changed the first Episc. church in New England to the first Unit. church in the country, and held his connection with it till death. He was a member of the first Boston school committee, member of the Acad. of Arts and Sciences, and a founder of the Mass. Hist. Society.

FREE'MAN—FREED'MAN: in the most general acceptance—the first, one who has inherited the full privileges and immunities of citizenship: the second, one who has been delivered from bondage, but usually is not placed in full social or even political equality with him who was freeborn; e.g. the emancipated slaves in the Southern States. Though the words are Teutonic, the distinction between them depends on the constitution of Roman society. The equivalent for freeman (*liber homo*), indeed, comprehended all classes not slaves; but the distinction here pointed out was preserved by the application of the term *ingenuus* to him who was born free (Gaius, i. 11), and of *libertinus* to him who, being born in servitude, was emancipated. For further development of this subject in classical antiquity, see **SLAVERY: CITIZEN**. As the organization of Roman society survived the convulsions of the middle ages to a far greater extent in the towns (see **MUNICIPALITY: MUNICIPAL CORPORATION**) than in the landward districts, where the institutions of fendality almost entirely superseded it, it is

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in the borough and other municipal corporations of Britain and of continental Europe, that we still find *freemen*, or persons inheriting or acquiring by adoption, purchase, or apprenticeship, the rights of citizenship: see **FREEMAN'S ROLL**. But the idea of a freeman was not peculiar to the Roman or Romanized population of Europe; on the contrary, it belonged to the constitution of society in all the Indo-Germanic nations. Among those commonly known as Teutonic, it was generally based on the possession of some portion of the soil. In Anglo-Saxon England, the freemen were divided into *Ceorls* (q.v.) and *Eorls* (q.v.), or *Thanes* (q.v.): see **CITIZEN**.

FREEMAN'S ROLL: in England and Wales, a list of persons admitted burgesses or freemen in each borough, made out by the town-clerk—for distinction of such persons (and for confirmation of certain reserved rights) from the class of burgesses newly created by 5 and 6 Will. IV. c. 76, commonly called the Municipal Corporations' Act, which placed the corporate towns (or, as they are denominated, the boroughs enumerated in the schedules A and B—i.e., nearly all the boroughs in England and Wales except London—) under one uniform constitution. See **BURGESS**.

FREE METHODISTS: see **METHODIST CHURCH**, **FREE: METHODISTS**.

FREEPORT: city, cap. of Stephenson co., Ill.; on the Pecatonica river; at crossing of the Illinois Central and the Western Union railroads, and w. terminus of a branch of the Chicago and Northwestern railroad; 35 m. n. of Dixon, 70 m. e.s.e. of Dubuque, 121 m. w. of Chicago. It contains 2 national banks (cap. \$250,000), 2 private banks, co. court-house, F. College (Presb.), 14 churches, high and graded schools, beet-sugar factory, several foundries, and iron-mills, woolen-mill, and other manufactories. Pop (1880) 8,516; (1890) 10,189; (1900) 13,253.

FREE PORT (Ital. *porto franco*): harbor where ships of all nations may enter on paying a moderate toll, and load and unload. Free ports form *dépôts* where goods are stored at first without paying duty; these goods may then be either re-shipped for export on paying a mere transit duty, or they may pay the usual full customs of the country, and be admitted for home consumption. Free ports thus facilitate transit trade, and form, as it were, a foreign district within a state. See **WAREHOUSING SYSTEM**.

FREE RELIGION: theory concerning religion, advocated by an assoc., organized Boston 1867, May 30, by a number of persons under the leadership and presidency of Octavius Brooks Frothingham, with a view to freeing religion from all sectarian limits, reconciling the various faiths, and applying the scientific method to the study of theology. Extreme liberty of opinion is permitted every member, and in the meetings of the assoc., any one may maintain such views as he believes nearest right and truth on whatever subject may be presented for discussion or study. The assoc. holds conventions, distributes many

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publications, and publishes its annual reports in the *Boston Index*. Its influence is strongly against evangelical Christianity; indeed it holds that no religious tenet can be held as established so as to be worthy of general belief—unless it be the tenet that there is no tenet. Associations similar, though less prominent and permanent, have been formed in other places.

FREE'-SOILERS: see POLITICAL PARTIES.

FREE-SPIRIT, BRETHREN OF THE: fanatical sect of the middle ages, generally (though sometimes secretly) diffused over Italy, France, and Germany, between the 13th and 15th c. They took their name from the 'freedom of spirit' which they claimed, in virtue of the words of the apostle Paul (Rom. viii. 2, 14), maintaining that the true sons of God are exempt from subjection to the law. They appeared first in Alsace, early in the 13th c., and attracted notice by their singular attire and their fanatical proceedings, traversing the country in troops, accompanied by women, with whom, under the name of sisters, they lived in the greatest familiarity: Their doctrine was a species of pantheistic mysticism, which they applied with fearless consistency to all the details of moral obligations. They held, according to Mosheim, who has collected the original authorities, 'that all things emanate from God, and will revert back into Him; that rational souls are part of the Divine Being; that the whole universe is God; that a man, by turning his thoughts inward, is united inexplicably with the First Cause, and becomes one with Him; and that those who are so immersed in the vortex of the Deity attain to perfect freedom, and are divested not only of the lusts, but even of the instincts, of nature.' From these principles, they inferred that the free man, thus absorbed in God, is himself God, and a son of God, in the same sense in which Christ is called the Son of God; and that, as such, he is raised above all laws, human and divine; to such a degree that, according to some of them, 'the god-like man cannot sin, do what he may; either because the soul, being elevated and blended with the divine nature, is no longer affected by the actions of the body, or because the emotions of the soul, after such union, become in reality the acts and operations of God himself, and therefore, though apparently criminal and contrary to the law, are really good and holy, because God is above all law!' These blasphemous and immoral principles, incredible as they may appear, are extracted by Mosheim, partly from the books of the sect, partly from the decrees of Henry, Abp. of Cologne, by whom they were condemned. They drew down upon the sect the arm of the state as well as the censures of the church. No sect of the time suffered so much from the inquisition in the 14th c. They were regarded as offenders against public order and morality, as well as against the faith of the church: see INQUISITION. After the first appearance of the sect in Alsace (1212), where its leader was a certain fanatic called Ortlieb (after whom the members are sometimes called Ortliebians), it

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spread into Thurgau and the Upper and Lower Rhein. During the latter part of that century, one of the leaders, named 'Meister Eckart,' had so large a following at Cologne, that the archbishop made his teachings the subject of a lengthened edict. The sect spread also in Swabia, where its members were confounded with the Beghards. In France, they were popular known by the name 'Tur-lupins,' a word of uncertain etymology. They were in Bohemia in the beginning of the 15th c., and there is considerable similarity between their principles and those of the Adamites, who figure in Hussite history. From this date they are heard of no more.—See Mosheim, Soames's ed. II. 582; also Gieseler's *Church History*, III. 467, IV. 226.

FREE'STONE: any rock which admits of being *freely* cut and dressed by the builder; in many places F. is synonymous with sandstone. It has been defined also as any rock which works equally freely in every direction, having no tendency to split in one direction more than another: in this sense, lime stone and even granite have been called freestones.

FREETHINKERS: term applied to certain English deists who wrote chiefly in the early part of the 18th c. It was used to characterize Toland in 1697, and was accepted by Collins in his *Discourse of Free Thinking*, 1713; but soon became an opprobrious designation, as the writers of this school denied some of the prevalent tenets as to revelation, atonement, etc. They had been preceded by Lord Herbert of Cherbury (1581–1648), Thomas Hobbes (1588–1679), Lord Shaftesbury (1621–1683), and others, against whom Charles Leslie (1645–1722) directed his *Short and Easy Method with the Deists*, 1694. The principal F. were Matthew Tindal (1657–1733), John Toland (1669–1722), Antony Collins (1676–1729), Thomas Chubb (1679–1747), and Thomas Woolston (1669–1732): to these may be added the more famous names of Lord Bolingbroke (1678–1751) and David Hume (1711–1776). These men were of widely varying conditions and attainments; each was responsible simply for his own declared opinions; they attempted no organization, and pretended to no agreement except as to the supremacy of reason in matters of religion. They were strong theists; only one of them appears to have been a materialist—William Coward, whose books were burned by the hangman 1704. Their writings, or some of them, excited much attention, and called forth a multitude of replies, of which the most celebrated are Warburton's *Divine Legation of Moses*, 1738, and Leland's *View of the Principal Deistical Writers*, 1754. The English F. aimed to write under the direction of pure common sense. Voltaire and the Encyclopedists, who paved the way for the French Revolution, had much more to do with passion and politics. The German biblical critics of Tübingen, etc., were cloistered students and metaphysicians.—The technical and historical application of the term F., and of its synonym Rationalists, in narrowing the meaning to a set

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of men who proclaimed certain distinctive tenets, departs widely from the original and natural signification of the words. Properly, a freethinker or rationalist is simply one who follows reason and exercises the right and duty of private judgment—which is the essential principle of Protestantism, as against submission of the intellect to church authority, whether vested in popes, councils, or wheresoever. The words indicate the means used, not the end attained. Principal Tulloch has shown that rationalism may be either Christian or infidel, and a freethinker is not necessarily an unbeliever. Independent thinking in the church is essential to intellectual life, without which spiritual life does not usually thrive. Yet the present popular use of language appears to commend free thought while condemning freethinkers. See INFIDELITY: DEISM: RATIONALISM: FREE RELIGION: also names of most of the writers mentioned above.

FREE-TOWN [name of the same significance as the *Liberia* of American origin s. of it]: town, capital of Sierra Leone, British settlement on the w. coast of Africa. It is on the left bank of the Sierra Leone river, about 5 m. from the sea; lat. $8^{\circ} 29'$ n., and long. $13^{\circ} 9'$ w. The town is pleasantly situated, and its wide streets are prettily ornamented with rows of orange, lime, banana, or cocoa-nut trees. The temperature is nearly uniform, varying in opposite seasons between the averages of $77^{\circ} \cdot 6$ F. and $80^{\circ} \cdot 9$. Toward the interior, F. is enclosed by the mountain-chain from which the colony is designated, a position to which the proverbial insalubrity of the climate is partly owing. Pop., exclusive of the authorities and the garrison, almost exclusively of liberated negroes (1901) 34,463.

FREE TRADE.

FREE TRADE: exchange of articles in commerce between inhabitants of different countries, free from customs duties or similar imposts by the respective governments. This is the strict meaning of the term, and may be attributed, as an ideal, to some political economists; but is scarcely accepted as indicating the practical aim of any recognized school or party. In common usage, F. T. means international trade free from governmental imposts beyond those necessary for revenue only. Thus used, it is the opposite of *protective duties* on imports—duties on articles of foreign production which will so increase their cost as to protect the domestic products from such foreign competition as would render the domestic production unprofitable. The prominent example of F. T. in this sense is Great Britain, though even in this case the principle can scarcely be said to be applied thoroughly and universally. The argument and the claim common in British writers who uphold F. T. are briefly as follows:

F. T.—it is said—which, till abt. 1841, expressed a disputed proposition, and was the badge of a political party, now expresses the most important and fundamental truth in political economy. From its simplicity, it affords, to those who expect to make political economy an exact science, the hope that they have obtained at least one axiom. But it has in reality been established as the result of a double experience—the one being the failure of all deviations from it, the other the practical success of the principle during the short period in which it has been permitted to regulate the commerce of this country.

Trade consists in buying and selling. There is F. T. when there is no interference with the natural course of buying and selling, if such interference be intended to improve or otherwise to influence trade. It is necessary to keep this distinction in view, because there are many laws not contrary to the spirit of F. T. which interfere with buying and selling; for instance, in this country (Britain) it is unlawful to deal in slaves, because we do not acknowledge the right of one human being to be the owner of another; it is unlawful to sell intoxicating spirits without a license, because the tax for the license brings revenue to the exchequer, and intoxicating liquors are a dangerous commodity which it is advisable to tax, in preference to the common necessities of life or even harmless luxuries. There are many of these last which cannot be sold into this country (Britain) without paying customs duty, but this is for revenue merely, not as a restraint on trade.

The many attempts made by governments to regulate trade for the purpose of benefiting the communities over which they ruled, may be divided into two great classes: one prohibited the exportation of commodities, the other encouraged exportation, and prohibited or discouraged importation. The former was the old rule in Britain and in other countries. It was supposed that the wealth of the country depended on its retaining within itself certain productions of native growth or industry, and their removal out of the country was prohibited or restrained.

FREE TRADE.

Until a late period, the exportation of machinery was prohibited; but this was an exceptional remnant of the old principle, which had yielded to its converse, in which it was maintained that exportation is the source of wealth, and importation is a wasting of a nation's substance. On this theory was founded the great body of British commercial and financial legislation, which received its death-blow 1846. By it, a commercial community was then likened to an isolated human being possessed of a certain fund which he must of course spend, so as to become so much the poorer, if he buys commodities, which to him is equivalent to a nation's importing them. The notion was founded on the analogy of the miser, who will, of course, increase his store by restricting his purchases. Communities, however, are not in the position of the miser, possessing separate capital, which he can protect and increase; they rather resemble the merchant who buys and sells, making a profit on what passes through his hands. Whatever communities import, they pay for by exports. This can be shown by analysis in any class of national transactions. If we pay by bills of exchange for the goods that we import, these bills represent goods exported, otherwise they would not be paid: see EXCHANGE. If we pay for goods in bullion, it is the same thing; gold does not grow in this country, and every sovereign we send abroad to pay for goods has been got as the price of goods exported, unless it have been brought by some of our own people from the gold districts, and then it is virtually a product of British industry. It is, in fact, a sort of dynamic law that importation causes exportation, as in physics a vacuum is filled by air, or the other nearest fluid.

As applied to the individual inhabitants, and not to the nation, F. T. is the right of every man to do as he pleases with his capital and abilities; and as the general desire of mankind is to improve their condition, and, in fact, the greater portion of them are thoroughly devoted to this pursuit, the interests of the nation at large cannot be in better hands than in those of men who, by increasing their own wealth, are increasing the wealth of the public. The progress made by this country (Britain) since 1846 has afforded a wonderful experimental illustration of this truth, since the exports have increased immensely: they were in round numbers, 40 millions sterling, and are now 290 millions.

The foregoing British argument and claim for F. T. (see also ANTI-CORN LAW LEAGUE: CORN LAWS: CUSTOMS DUTIES), doubtless represent the opinion of an overwhelming majority of political economists in that country; though in very recent years a few voices are heard ascribing to this policy various evils recognized and augmenting, such as agricultural depression, and a frightful extent of pauperism, resulting—so say these few—from the fierce competition of British manufacturers to undersell all the nations of the earth. In other countries the opposers of F. T. point out that a system proper and beneficial to a small insular country, is not thereby shown to be so for countries of vastly differing characteristics.—See further, works of

FREE-WILL.

John Stuart Mill, Macleod, Amasa Waiker, Prof. Perry, Prof. Sumner; Bastiat's *Sophisms of the Protectionists*; Grosvenor's *Does Protectionism Protect?*—For the argument against F-T., see TARIFF, PROTECTIVE.

FREE-WILL: designation of a doctrine in opposition to the doctrine of 'philosophical necessity.' The contest between these two views has been maintained in the fields both of theology and of metaphysics. In philosophy the idea of a man being 'free' in his actions appears first in the writings of the ancient Stoics. Afterward in Philo Judæus, Alexandrian Platonist, at the commencement of the Christian era, the inquiry is propounded, 'whether it be not the case that the upright man is free, and the vicious man a slave.' This language was evidently meant to pay a compliment to virtue, and to affix a degrading stigma on vice, and is not to be too literally interpreted as a dictum of philosophy. In systematic theology, the doctrine of freedom as applied to the human will, was contended for first by Pelagius against Augustine's doctrines regarding the operation of divine grace; and in a later age was the subject of controversy between Arminians and Calvinists—the Calvinists (such as Jonathan Edwards) having often been classed as Necessitarians, or, at least declared by their opponents to hold opinions which could logically be pressed into Necessitarianism. It is certain however, that the theory of a *physical* determinism of man's will—favorite metaphysical speculation in the natural science of recent years—would have been refused with horror by Edwards and writers of his school, as denying moral responsibility, and the possibility of man's holiness or sin, and any ineradicable distinction between man and the brutes.

Although in this dispute there are certain points of vital difference between the opposing parties, yet the problem has been needlessly encumbered with the unsuitable phraseology that has accidentally invested it; also, by an often unconscious shifting of the issue from its main point; or involving with the main point other points either not properly relative, or lying in the back-ground of mystery not now penetrable by human thought. Free-will has been sometimes maintained or denied as though it involved an act free from constraint of reason—mere arbitrariness. The true idea of freedom or liberty for a being like man, has been left out; freedom of will has been changed to freedom *from* will. The opposite word 'necessity,' also has great ambiguity; being applied sometimes to logical and mathematical implication, as when we say the whole is greater than its part; sometimes to the rigorous uniformity of physical laws, such as gravitation; sometimes to an evident and absolute inevitableness, like that of the old pagan *fate*; sometimes on the other hand, to a mere certainty of futuration, altogether different from a necessity; and sometimes to what is merely a high probability, as when we expect that a man of honorable and upright character will speak the truth on some given occasion: see NECESSITY.

Free-will is neither to be proved nor to be disproved by either proving or disproving a law of uniformity in human

FREE-WILL BAPTISTS—FREEZING MIXTURES.

actions—nor by either proving or disproving some pressure of motive or some presence of a cause for human actions. These things are proper subjects of philosophical analysis and classification as far as evidenced by their effects, and they may help to a natural science of the Will; but free-will involves the action of a moral personality with moral relationships; and that personality, dimly but surely recognized in human consciousness, has not yet been fathomed and delineated as to its nature, by science. Our science is backward in this department; as it was backward for many thousand years concerning gravitation, electricity, light, and is still backward in tracing the inmost nature of these existing things. The doctrine of Free-will amounts to the simple assertion, based on an appeal to man's consciousness, that man has and knows that he has, a certain power to choose certain courses of action, especially in moral affairs, and to choose to yield to certain motives and to resist others; or that if he seem to himself to be now without such conscious liberty, he yet has a conviction that that power belongs to his proper nature—that he ought to have it, and that it may yet be regained. It is not at all necessary to the doctrine of free-will that every man shall be always conscious of his liberty, or be always in exercise of it, or never be able actually to lose it in any direction or degree or for any period. These questions and many others have their proper place, but their place is not in this debate between free-will and determinism.—See WILL: also SPONTANEITY: NECESSITY: EMOTION: ASSOCIATION OF IDEAS.

FREE-WILL BAPTISTS: see BAPTISTS, FREE-WILL.

FREEZE, v. *frēz* [Icel. *frjosa*; Sw. *frysa*, to freeze: Dut. *vriesen*, to tremble with cold: Low Ger. *vresen*, to be cold: F. *frisson*, a shivering]: to congeal; to be congealed; to harden into ice; to chill; to shiver with cold; to become chilled with cold; to kill with cold. FREEZ'ING, imp.: N. the process or state of congealing. FROZE, pt. *frōz*, did freeze. FROZEN, pp. a. *frō'zēn*, hardened into ice; congealed by cold. FREEZ'ABLE, a. *-ā-bl*, that may be frozen. FREEZING-POINT, the degree of cold at which water turns into ice, being 32° Fahr. (see THERMOMETER). FREEZING AND FUSING POINTS: see FUSING AND FREEZING POINTS.

FREEZ'ING MIXTURES: substances used in producing artificial cold. When matter passes from the solid into the liquid state, heat in large quantity disappears, and ceases to effect the thermometer: see HEAT. The chemist avails himself of the fact that heat disappears during liquefaction, for procuring artificial cold. When a piece of ice having a temperature of 32° F. is placed in its own weight of water at 174°, we find, on testing the water with the thermometer after the ice has melted, that its temperature is 32°; the heat which the water contained having disappeared during the melting of the ice. As water in passing from the solid to the fluid state possesses the property of rendering latent a greater amount of heat than any other substance, it is, when in a solid form as ice or snow, or

FREGENAL DE LA SIERRA—FREIBERG.

when combined with salts as water of crystallization, a powerful agent in producing artificial cold.

The substance employed in freezing mixtures should be finely powdered, rapidly mixed, and placed in vessels with little conducting power. The following are a few of the important formulæ for these mixtures: 1. A mixture of 2 parts of pounded ice or of fresh snow and 1 part of common salt, causes the thermometer to fall to -4° . 2. A mixture of 5 parts of commercial hydrochloric acid and 8 parts of powdered crystallized sulphate of soda, causes a reduction of temperature from 50° to 0° . 3. Equal parts of water, of powdered crystallized nitrate of ammonia, and of powdered crystallized carbonate of soda, produce a cold of -7° . 4. A mixture of 3 parts of crystallized chloride of calcium, previously cooled to 32° , and 2 parts of snow, produces a cold of -50° , sufficient to freeze mercury. 5. By dissolving solid carbonic acid, or solid nitrous oxide gas, in sulphuric ether, temperatures of from -120° to -146° may be obtained, at which alcohol passes to the consistency of oil, and finally to that of melted wax. This is the most powerful freezing mixture known.—The freezing mixtures used by confectioners, and most convenient for ordinary experimental purposes, are the first and second of the above list.—See ICE: REFRIGERATING MACHINES.

FREGENAL DE LA SIERRA, *frā-čhā-nāl'dā lá sē-ēr'rá*: town of Spain, 30 m. s.e. of Badajoz, in a valley among mountains. There is an ancient castle, within which is the bull-ring. Pop. 8,000.

FREIBERG, *frī'bērĥ*: ancient city of Germany, centre of administration for the Saxon mines; on the n. slope of the Erzgebirge mountains, on the left bank of the Münzbach, not far from its confluence with the Mulde, 20 m. s. w. of Dresden. It owes its origin to its silver mines, discovered about 1190. It is still surrounded by old walls and towers, and contains many interesting buildings and institutions, of which the principal are the town-house, dating from 1410, and the cathedral (1484–1512), two stately Gothic edifices, and the Berg-Academie, or School of Mines, founded 1765, the most famous institution of the kind in Europe. At the Berg-Academie, instruction is given by professors in surveying, mining, the preparation of ores, geology, mineralogy, etc. It possesses lecture-rooms, a library, and mineralogical and geological; and has three separate laboratories, and an office for the sale of minerals. Humboldt, Werner, Jameson of Edinburgh, and many other eminent geologists and mineralogists, studied at this institution. There are, it is said, about 150 mines of silver, copper, lead, and cobalt around Freiberg. The manufactures consist principally of articles in imitation of gold and silver ware, of white lead, gunpowder, iron and copper wares, etc. In the 17th c. F. was a place of great wealth, and had a pop. of 40,000. The mines have of late greatly fallen off, owing either to the richest veins being exhausted, or to the shafts being driven so deep that the water cannot be drained off from them. Pop. (1900) 30,175.

FREIBURG.

FREIBURG, *frîbürg*: town of Germany, grand duchy of Baden, cap. of the circle of the Upper Rhine, seat of an archbishop; on the Dreisam, on the w. border of the Black Forest, 42 m. s.s.e. from Strasburg. It is an open, well-built town; the walls and ditches with which it was formerly surrounded, have been converted into promenades and vineyards. The Minster or Cathedral of F. is one of the most beautiful and perfect specimens of Gothic architecture in Germany. It is cruciform, of red sandstone, was begun 1122, and not thoroughly completed till 1513. It has a tower 367 ft. high, remarkable for elegance and lightness. In one of its chapels, the University Chapel, there are, among other pictures, a Nativity and an Adoration by Holbein, the latter considered one of his most successful pictures. The University of F. was founded 1456; in 1891 it had 101 professors and teachers, and 931 students. The Exchange (*Kaufhaus*) is a quaint Gothic structure of the 16th c. The chief manufactures are chicory, tobacco, paper, potash, etc. Pop. (1885) 41,310, of whom over half were Protestants; (1890) 48,788; (1900) 61,504.

FREIBURG, or **FRIBOURG**: canton. of Switzerland, bounded n. and e. by Bern, s. and w. by Vaud and the Lake of Neuchâtel; 642 sq. m. The surface of the country is hilly, the mountains in the s. of the canton forming a continuation of the Bernese Alps, and rising in the highest points above 7,000 ft. The principal rivers are the Saane or Sarine—which traverses almost the whole extent of the canton from its s. to its n. extremity—and the Broye. The country abounds in excellent meadows and rich pastures, on which are reared the strongest horses and the best breed of cattle in Switzerland; indeed, the great part of the wealth of the canton consists in cows, sheep, goats, and horses, of which in proportion to its area there are great numbers. Dairy husbandry, and especially cheese-making, is pursued with great success; 40,000 cwt. of cheese are said to be made yearly. There are considerable manufactures of straw-plait, leather, cherry brandy, and tobacco. F. was received as a member of the Swiss confederation 1481, and a liberal constitution was established 1848. It sends six members to the national council. More than two-thirds of the people are French, the remainder Germans. The official language is French, but all laws and decrees for the whole canton are published in both French and German. Pop. (1880) 115,400; (1888) 119,155; (1900) 127,951.

FREIBURG, or **FRIBOURG**: town of Switzerland, cap. of the canton of F.; on both banks of the Sarine, but chiefly on a hilly promontory formed by one of its windings, about 18 m. s.w. of Bern. Seen from some distance, the town has an imposing and picturesque appearance. Houses climb to the top and extend to the very edge of the precipice that overhangs the river, and in another portion of the town they form terraces, the roofs of one tier on a level with the pavement of another; while the whole is surrounded by a long rising and falling line of embattled walls, with watch-towers and gateways of ancient fortifica-

FREIESLEBENITE—FREIGHT.

tions still in good condition. The banks of the Sarine are connected by four bridges, one a suspension-bridge, 906 ft. long, 23 ft. wide, and 175 ft. above the stream, one of the longest bridges of a single span in the world—about 300 ft. longer than the Menai Bridge. Another suspension-bridge spans the gorge of Gotteron, and is about 700 ft. long, and 317 ft. above the valley beneath. The church of St. Nicholas, a fine Gothic structure, has an organ built by a native of F., which has 7,800 pipes, one of them 32 ft. long; it is considered the finest toned instrument in Europe. This church has also the highest spire and finest set of bells in Switzerland. The other principal buildings are the Cantonal School (previous to 1848 the Jesuits' College), the most conspicuous building of the town; and the Lyceum. The inhabitants of the upper portion of the town speak French; of the lower portion, German. F. has few manufactures; the chief are woolens, hardware, leather, pottery, and tobacco. Pop. (1888) 12,244, of which only a few are Protestants.

FREIESLEBENITE, n. *frī'ēs-lā'bēn-īt* [after Herr *Freiesleben*]: a valuable ore of silver, combined with antimony and lead, in the form of sulphides.

FREIGHT, n. *frāt* [Ger. *fracht*, the loading of a wagon or ship; *ferchen*, to despatch: Swiss, *ferken*, to forward goods (see **FRAUGHT**)]: the cargo or part of the cargo of a ship: the hire of ship; the charge or price for transporting goods by water (see below): V. to load with goods for transport by water; to engage or hire for transport of goods. **FREIGHT'ING**, imp. loading or carrying, as a ship. **FREIGHT'ED**, pp. loaded, as a ship. **FREIGHT'ER**, n. one who. **FREIGHT'LESS**, a. without a freight. **FREIGHTAGE**, n. *frāt'āj*, money paid for freight.

FREIGHT [word having the same origin as 'fare']: the hire of a ship, or part of a ship, for the transport of merchandize; also the merchandize so transported. The agreement for the service is termed a Charter-party (q.v.)—The meaning of the word has recently been enlarged to denote merchandize conveyed by land; also the money paid for such conveyance. In the United States the railways are provided with freight-cars—known in England as goods-vans. See **CARRIERS**.

If a merchant freight a whole ship, but neglect to fill it, the captain is not at liberty to complete the cargo from other sources, without accounting to the merchant for any moneys received for such additional load. On the other hand, if the merchant covenant to freight a certain portion of a ship, he is bound to pay the sum agreed on for that portion, notwithstanding his goods may fail to occupy so much space. If, in the charter-party, a day be appointed for sailing, and either the merchant fail to have his goods ready for embarkation by the time fixed, or the vessel be unprepared to start—wind and weather permitting—the agreement may be declared void by the aggrieved party, who can also recover at law for any detriment caused to his property by the delay. The use of charter-

parties has been traced back as far as the reign of Henry III.

This contract, generally in commercial language called freight, is commonly spoken of by Scottish legal writers as Affrightment, from the French *affrètement* (Bell's *Com.* i. p. 414); but throughout the whole commercial world, so far as the provisions of the contract are not made subject of positive stipulation either by Charter-party or Bill of Lading (q.v.), they will be held in accordance with the universal usage of trade, and of that particular branch of trade to which the hiring has reference.

It was formerly held that the payment of the wages of the crew was, with various exceptions, contingent on the earning of freight by the ship, in accordance with the maxim of Lord Stowell, that 'freight is the mother of wages.' But this rule, has been abrogated in England, and wages may now be recovered either by seamen or apprentices, even though no freight has been earned by the vessel. The seamen has a right to cling to the last plank in satisfaction of his wages; but in cases of shipwreck, his claim for wages will be barred if it be proved that he did not exert himself to the utmost to save the ship, cargo, and stores. The onus of proof is properly laid on those who impugn the conduct of the seaman. The old rule is in some extent still adhered to in the United States, but it is not applied to the master, and it does not hold with reference to seamen if the freight has been lost by the fault either of the master or owner; e.g., if the ship has been seized for debt, or for having contraband goods on board. See Kent's *Com.* xii., 266, 267.

FREILIGRATH, *frī'lich-rât*, FERDINAND: 1810, June 17—1876, Mar. 18; b. Detmold, principality of Lippe: brilliant lyric poet of Germany. He attended the high school in his native town till 1825, then entered a merchant's office, first at Soest, afterward at Amsterdam. Encouraged by the favorable reception of his poems, he abandoned merchantile pursuits, married, and removed to Darmstadt. In 1842, a pension was bestowed upon him by the king of Prussia, whereupon he removed to St. Goar, on the Rhine. This circumstance, and his poem *Aus Spanien*, deprived him of the sympathy of the liberal party, which, however, was restored to him twofold when, 1844, he gave up his pension, and in his political poems attached himself to the democratic party. The publication of his *Glaubensbekenntniss* (Confession of Faith), in the same year compelled him to take refuge abroad. He went to Belgium, Switzerland, and 1846 to London, where he resumed his merchantile pursuits, and became correspondent for the banking-house of Huth & Co. He was about to accept an invitation to America, sent him by Longfellow, when the events of 1848 recalled him to his native country. F. settled in Düsseldorf, where he became the most important member of the democratic party, and sang the praises of democratic socialism. He was impeached on account of his poem *Die Todten an die Lebenden* (The Dead to the Living). The interest felt in this trial was extraor-

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dinary. F. was defended by celebrated advocates, who did not fail to ridicule the folly shown in prosecuting a man for writing poetry. The doctrine that the poet is a 'chartered libertine' in the expression of his sentiments, carried the day, and F. was acquitted, 1848, Oct. 3. The consequence was inevitable. His poem immediately became the rage; the first edition was sold in Düsseldorf within a few hours. A second prosecution induced F. again to withdraw from his native country, and 1849-68 he resided in London. In the latter year, he returned to Germany, and made Stuttgart his home. Several songs, written by him there at the beginning of the Franco-German war, have had great popularity. F.'s principal productions are his *Gedichte* (1838; 27th ed. 1871); *Ca Ira!* (1846); *Die Revolution* (1848); and *Neuere politische und sociale Gedichte* (1849). Complete editions of his works appeared at New York (6 vols. 1858-9), and at Stuttgart (6 vols. 1870; 2d ed. 1871). F.'s poems display lively imagination, fire and melody of rhythm, a richness of execution, and a picturesque originality of style, which often passes into eccentricity and merely 'spasmodic' force of expression. His translations from English poets are admirable. F. died at Cannstadt, near Stuttgart.

FREIRIRA, *frā-ē-rē'rá*: seaport of Chili, province of Atacama, at the mouth of the Guasco; a place of some trade. Pop. 10,000.

FREISCHÜTZ, *frī'shütz* (the free-shooter): in German legend, a hunter or marksmen who, by entering into a compact with the devil, procures balls, six of which infallibly hit, however great the distance, while the seventh, or, according to some versions, one of the seven, belongs to the devil, who directs it at his pleasure. Legends of this nature were rife among the troopers of Germany of the 14th and 15th c., and during the Thirty Years' War. The story appeared in a poetic form first in 1810 in Apel's *Gespenserbuch* (Ghost-book, 1810-15), and F. Kind adapted the story (1843) to the opera composed by Weber 1821, which has made it known in all civilized countries.

FREISING, *frī'zing*: town of Bavaria, in a fruitful, agreeable district on the left bank of the Isar, 20 m. n.e. of Munich. The town was the seat of an episcopal prince till 1802, when the see was secularized. The bishopric of F. dated as far back as 724, but its bishops were made princes first by the Emperor Ferdinand (1619-37). The chief buildings are the palace formerly of the bishop, and a beautiful cathedral, dating from the 12th c., having three naves, two towers, and a singular crypt, the pillars of which have monsters crawling up their shafts. The people are employed in brewing and distilling and the manufacture of vinegar, tobacco, saltpetre, etc. Pop (1890) 9,486.

FRÉJUS, *frā-zhüs'* (anc. *Forum Julii*): small town on France, dept. of Var, a mile inland from the embouchure of the Argens (anc. *Argenteus*) into the Mediterranean Sea, 15 m. s.e. of Draguignan. It was originally a colony

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from Marseille, and was afterward colonized anew by Julius Cæsar, and called Forum Julii. It has remains of ancient Roman walls, and of a Roman circus and viaduct. The ancient harbor, at one time the most important Gallic port, and in which Augustus posted the fleet of 300 galleys which had been captured from Antony at Actium, has become silted up. Here, or rather at the new harbor of St. Raphael, $1\frac{1}{2}$ m. off, Napoleon landed on his return from Egypt 1799, and embarked for Elba 1814. Pop. 3,000.

FRELINGHUYSEN, *frē'ling-hī-zēn*, FREDERICK: 1753, April 13—1804, April 13; b. Somerset co., N. J.; lawyer. He graduated at Princeton College 1770, was admitted to the bar 1774, elected member of the N. J. provincial congress 1775, re-elected 1776, and chosen by the legislature representative in the continental congress 1778. He resigned the latter office 1779, served again in it 1782-3. He was in active service through the revolutionary war, rose to the rank of col., and after its close held several state and county offices till 1793, when he was elected U. S. senator. The next year he held a maj.gen's. command during the Penn. whiskey insurrection, and resigned the senatorship on account of bereavements, 1796.

FRELINGHUYSEN, FREDERICK THEODORE, LL.D.: 1817, Aug. 4—1885, May 20; b. Millstone N. J.: lawyer and statesman. He lost his father at an early age and was adopted by his uncle, Theodore F., whose Christian name he added to his own. He graduated at Rutgers College 1836, studied law in Newark with his uncle, was admitted to the bar 1839, and the same year succeeded to the practice of his uncle when the latter assumed the chancellorship of the Univ. of New York. He became city attor. 1849, city counsel 1850, attor.gen. of N. J. 1861, member of the Peace Congress 1861, was re-appointed attor-gen. on expiration of his first term 1866, and in the same year was appointed U. S. senator as a republican to fill vacancy in a term ending 1869, Mar. 4. In 1870 he was appointed by Pres. Grant and promptly confirmed as U. S. minister to England, but declined the office, and 1871 was elected U. S. senator for a full term. At the expiration of this term he was succeeded by John R. McPherson, democrat. In 1881, Dec. he was appointed by Pres. Arthur sec. of state, succeeding James G. Blaine, was immediately confirmed, and held the office till the close of the administration. While in the senate he was a member of the committees on the judiciary, finance, naval affairs, claims, railroads, agriculture, and foreign relations, and was acting chairman of the latter pending consideration of the Alabama claims by the joint high commission. He voted for the conviction of Pres. Johnson, was intrusted by Charles Sumner with his famous Civil Rights Bill and advocated it till it passed the senate, was a member of the joint committee that reported the Electoral Commission Bill, and was a member of the commission.

FRELINGHUYSEN, THEODORE, LL.D.: 1787, Mar. 28—1861, Apr. 12; b. Franklin. Somerset co., N. J.: lawyer

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and statesman. He graduated at Princeton College 1804, was admitted to the bar 1808, was attor.gen. of N. J. 1817-29, declined office of judge of the supreme court 1826, and was U. S. senator 1829-35. At the expiration of his term he resumed practice in Newark, was elected mayor 1837, 8, was chancellor of the Univ. of New York 1838-50, whig candidate for vice-pres. of the United States on the Clay ticket 1844, and pres. of Rutger's College, New Brunswick, N. J., from 1850 till death. He was a man of eminent piety, was known as 'the Christian Statesman' while U. S. senator, was an efficient promoter of religious and charitable organizations, and was pres. of the American Board of Foreign Missions, 16 years; pres. of the American Bible Soc. 1846-61; pres. of the American Tract Soc. 1842-48; vice-pres. of the American S. S. Union from 1826 till near the close of his life, and vice-pres. of the American Colonization Soc. many years.

FREMESCENCE, n. *frê-mēs'ëns* [L. *frēmīscens*, uttering a low continuous growling or roar]: a confused, low, suppressed, and threatening murmuring among a multitude, forming the incipient stage of a popular tumult.

FRE'MONT, *frê-mont'*: city, cap. of Sandusky co., O.: on Sandusky river; at junction of the Lake Shore and the Lake Erie and Louisville railroads; 30 m. s e. of Toledo, 88 m. w. by s. of Cleveland. F. is at the head of navigation on Sandusky river, here crossed by a bridge; and contains large car, engine, boiler, sash, door, blinds, tub, barrel, carriage, and agricultural implement works, beside flouring mills, iron foundries, lime-kilns, and machine-shops; 1 national bank (cap. \$100,000), 1 state bank (cap. \$50,000), two private banks; 12 churches; high school and 14 public schools; several gas wells; and three public parks—two presented to the city by Sardis Burchard, the other comprising old Fort Stephenson purchased by the city. Pop. (1870) 5,455; (1890) 7,141; (1900) 8,439.

FREMONT, JESSIE BENTON: an American author, 1824-1902, Dec. 27; b. in Virginia; settled in Washington, D. C., 1838, and was educated in the Georgetown Seminary. She was the daughter of Thomas H. Benton, U. S. senator from Missouri, and the widow of Gen. John C. Frémont, whom she married in 1843. After her husband's death in 1890 she became a frequent contributor to magazines and newspapers. She was the author of *Story of the Guard: A Chronicle of the War*; a sketch of her father prefixed to her husband's memoirs; *Souvenirs of My Time*; and *The Will and the Way Stories*.

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FREMONT, JOHN CHARLES: 1813, Jan. 21—1890, July 13; b. Savannah, Ga.; explorer. He graduated at Charleston College 1830, taught mathematics privately and on the sloop-of-war *Natchez* 1830–35, was appointed prof. in the navy but declined, and became an asst. engineer in the U. S. topographical corps. He was engaged in exploring and surveying in N. C., Tenn., and Ga., 1836–38, and in the country between the Mo. river and the n. frontier 1838; was commissioned 2d. lieut. of topographical engineers 1838, July 7, and while preparing his report and maps of the n.w. region in Washington fell in love with Jessie Benton, daughter of Thomas H. Benton, U. S. senator from Mo.; and received orders to explore the Des Moines river section 1840. In 1841 he eloped with and married Miss Benton. In 1842 he took charge of an expedition to examine the Rocky Mountain region, explored South Pass and the Wind River Mountains, and Aug. 15 reached the summit (13,570 ft.) of Wind River Peak, since called Fremont Peak, which, so far as known, had never been trod by man. He spent four months on this trip, returned to Washington and prepared for congress 1842–3 a report that elicited high praise in that body and among scientific men in the United States and Europe. In the following year he received instructions to explore the unknown region between the Rocky Mountains and the Pacific Ocean and to connect his exploration with the surveys of Capt. Wilkes, U.S.N., so as to secure an uninterrupted survey of that vast region. His party numbered 39 and left the town of Kansas May 29. After travelling more than 1,700 m. he reached the 'Inland Sea' (Salt Lake) Sept. 6, and Fort Vancouver, on the Columbia river, the appointed terminus of the journey Nov. 4. On Nov. 10 he started on his return journey, proposing a circuit to the s. and s.e. and an exploration of the great basin between the Rocky and the Sierra Nevada mountains. He reached the first waters of the basin which he concluded was an unknown body and named it Pyramid Lake 1843, Jan. 10, struck the valley of the Sacramento Feb. 6, encamped on the summit of the pass in the dividing ridge (2,000 ft. higher than South Pass) which Indians told him no man could cross Feb. 20, made the passage without a guide in 40 days amid great hardships, reached Capt. Sutter's fort on the Sacramento Mar. 6, resumed his journey Mar. 24, and arrived at St. Louis Aug. 6 with vast stores of geographical knowledge of the region traversed. In 1845 he started on his third expedition designed for the survey of Or. and Cal. He advanced westward to the pass of the Cascades, where the Columbia river traverses the n. extremity of the Sierra Nevada, explored that chain southward in the depth of winter, and descended to the valley of the San Joaquin. Early in 1846 he started alone for Monterey, cap. of Upper Cal., and when near the city was ordered by Mexican troops to quit the country immediately. He sought his men, erected a fort on the Summit of Hawk's Peak, and raised the first U. S. flag on the territory of Cal. Soon afterward he continued his journey up the Sacramento valley into

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Or., and there received a secret despatch from the sec. of war instructing him to watch the govt's interests in Cal. in view of pending trouble with Mexico. He returned to Cal. June, aroused the American settlers in the vicinity of San Francisco Bay, captured a Mexican fort, garrison, 9 cannon, and 250 muskets at Sonoma Pass June 15, advanced to Sonoma, defeated the Mexican Gen. De Castro July 5, and was elected gov. of the province by the American Californians, who declared themselves independent of Mexico a few days afterward. He joined Com. Sloat, U.S.N., who had bombarded and captured Monterey, July 7, and on the arrival of Com. Stockton, U.S.N., with orders to conquer Cal., was appointed military commander and civil gov. of the territory. He assisted in the capture of Los Angeles Aug. 17, and 1847, Jan. 13, concluded articles of capitulation with the Mexicans which gave Cal. to the United States. After these brilliant exploits, he was divined to be the victim of an unfortunate clashing of authority. Com. Stockton and Gen. Stephen W. Kearny had received identical orders to conquer Cal. On the arrival of the latter he issued instructions to F. who had co-operated with the former in the early movements. F. was gov. by election of American residents and Stockton's appointment, but Kearny claimed the office as ranking officer. F. was placed under arrest by Kearny, tried by court martial on Kearny's charges at Washington, and sentenced to be dismissed the service for mutiny, disobedience, and prejudicial conduct. Pres. Polk remitted the sentence, But F. resigned his commission 1848, Feb. 19. In Oct. following he started on his fourth exploring expedition, fitted out at his own expense, for the purpose of surveying a route for a great road from the Mississippi river to San Francisco. He penetrated the previously unknown country of the Apaches, then at war with the United States, was lost in the snow while crossing the great Sierra, and was forced by losses in men and animals to return to Santa Fé. He promptly organized another party, discovered a safe and available route, and reached the Sacramento early in 1849. While surveying his Mariposa tract and searching for gold in it, he was appointed by Pres. Taylor commissioner to run the boundary between the United States and Mexico, and while so employed was elected one of the U. S. senators from the new state of Cal. Dec. 21. He drew the short term and served till 1851, March 4. In 1852-3 in Europe he was cordially received by scientists and men of letters; and learning that congress had made an appropriation for the survey of several routes from the Mississippi valley to the Pacific Ocean, he left Paris 1853, June, and in Aug. started on his fifth trans-continental expedition at his own expense. He discovered passes through the mountains on the line of latitude 38° and 39°, and, after living on horse-flesh 50 days and being without food of any kind two days, was rescued by Col. Babbit 1854, Feb. 8, and reached San Francisco May 1. In 1855 he removed to New York; 1856, June 17 received the presidential nomination of the first national republican convention, and a

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few days later, the nomination of the national American convention. He announced himself as opposed to the extension of slavery and in favor of free labor. In the election he received a popular vote of 1,341,000 and an electoral vote of 114, and was defeated by James Buchanan. In 1861 he was appointed maj.gen. in the regular army, purchased arms for the federal govt. in Europe, made his headquarters in St. Louis, July 26, fortified the city, and occupied Cairo. On being assigned to command the newly created western dept. he proposed plans for driving the Confederates from Mo., and the whole valley of the Miss., and for opening that river direct to New Orleans. He assumed the gov. of Mo., proclaimed martial law, suspended disloyal publications, and announced that he would liberate the slaves of all persons in arms against the federal govt. Pres. Lincoln objected to the emancipation scheme and requested F. to withdraw it, and on his refusal annulled it by an executive order. In 1861, Sept., he started in pursuit of the Confederate army under Stirling Price with a force of more than 20,000 men, including 5,000 cavalry, and 86 heavy guns. In the following month his force numbered 30,000, and Nov. 2, just as he had overtaken the enemy at Springfield, he was relieved of command. In 1862, March he was recalled to duty and placed in command of the new mountain dist., which included parts of Va., Ky., and Tenn., and fought a number of engagements with the Confederates under Gen. Jackson whom he pursued 8 days. In June F.'s corps was included in the new army of Virginia, to the command of which Gen. Pope was assigned, and F., unwilling to serve under an officer whom he ranked was relieved at his own request. These events closed his military career. In 1864 he received the presidential nomination of a convention of republicans at Cleveland, and accepted it. Shortly before the election he was persuaded to withdraw his candidacy in the interest of the republican party. Soon after the close of the war he became interested in a railroad project for uniting Norfolk with San Diego and San Francisco, and secured a grant of land from the Tex. legislature for the Memphis and El Paso branch. In disposing of the land-grant bonds in Paris his French agents asserted that the bonds were guaranteed by the federal govt., and this falsehood led to his being prosecuted by the French govt. for fraud 1873, and sentenced to fine and imprisonment in default of personal appearance. In 1873 he was appointed gov. of Arizona, and served till 1882. and 1890, Apr. 19, he was placed on the retired list as a maj.gen. of the army. He received a gold medal for his discoveries from the King of Prussia 1850, was voted the Founder's Medal of the Royal Geographical Soc. of London and elected honorary member of the Royal Geographical Soc. of Berlin, was nobly commended by Baron Humboldt, and became known in learned circles as 'The Pathfinder.' Beside the reports of his various exploring expeditions, which have been translated into nearly every European language, he published *Memoirs of My Life* (New York, 1886).

FRENCH—FRENCH BERRIES.

FRENCH, a. *frĕnsh*: pertaining to *France*: N. the language of France. **FRENCH'MAN**, n. a native of France. **FRENCHIFY**, v. *frĕnsh'ĭfĭ*, to infect with the manners of the French. **FRENCH'IFYING**, imp. **FRENCH'IFIED**, pp. *-fĭd*. **FRENCH BEANS**: see **KIDNEY BEANS**. **FRENCH CHALK**, a variety of steatite or soapstone used for marking. **FRENCH HORN**, a musical wind instrument. **FRENCH LEAVE**, to take without asking permission—alluding to the conduct of F. soldiers in time of war. **FRENCH POLISH**, a furniture varnish.

FRENCH, DANIEL CHESTER: sculptor: b. Exeter, N. H., 1850, June 9. He studied with William Rimmer in Boston and Thomas Ball in Florence, returned to the United States 1876, and resumed residence in Florence 1878. His works include *The Owl in Love* and *Dick Swiveller and the Marchioness* (dog groups in plaster); *The Minute Man of Concord* (unveiled on the battle-ground, Concord, Mass., 1875); *The May Queen*; *Elsie Venner*; colossal in St. Louis custom house, *Peace and War*; *The Waking of Endymion*: and statue of Gov. Chase, of Mich., for the National Memorial Gallery, Old Capitol, Washington.

FRENCH, L. VIRGINIA (*née SMITH*): 1830–1881, Mar. 31; b. Eastern Shore, Md.: poet. She was educated at Washington Female Seminary, Penn., removed with a sister to Memphis, Tenn., and opened a private school 1848, began writing for newspapers and magazines under the name of 'L'Inconnue,' went to New Orleans and became associate editor of the *Southern Lady's Book*, fashion magazine, 1852; married J. H. F., of McMinnville, Tenn., 1853, and was afterward editor of the *Crusader*, in Atlanta, Ga. Her published works include *Wind-Whispers*, poems (New York, 1856); *Iztalilco*, tragedy (1859); and *Legends of the South* (Atlanta 1867).

FRENCH, WILLIAM HENRY: 1815, Jan. 13–1881, May 20; b. Baltimore: soldier. He graduated at the U. S. Milit. Acad. 1837; served in the Seminole Indian war and on the Canadian border 1837–8; was aid-de-camp to Gen. Pierce in the Mexican war and took part in the siege of Vera Cruz, the battles of Churubusco and Contreras, and the capture of Mexico City; and was again in the Seminole war 1850–52. He was appointed brig.gen. of vols. 1861, Sep.; was in all the battles and engagements of the army of the Potomac during the Peninsular campaign; commanded a division at Antietam and Fredericksburg 1862; was promoted maj.gen. of vols. 1862, Oct.; and commanded the third army corps 1863, Nov.—1864, May, when he was mustered out of the vol. service. He commanded the 2d U. S. artill. on the Pacific coast 1865–72, became lieut. col. and commandant at Fort McHenry, Baltimore, 1875, and was retired 1880, July.

FRENCH BERRIES, or **AVIGNON BERRIES**, or **PERSIAN BERRIES**, or **YELLOW BERRIES** (Fr. *Graines d'Avignon*): small berries, fruit of certain species of buckthorn (q.v.), principally of the yellow-berried buckthorn (*Rhamnus infectorius*), used by dyers in dyeing yellow. For this purpose,

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they are gathered unripe and dried; they yield a rich yellow color, but as it is fugitive, mineral dyes have largely taken their place. It is, however, still exported from the Levant and from the s. of France: that from the Levant is the best. The yellow-berried buckthorn is a very spreading procumbent shrub, with ovato-lanceolate smooth leaves, growing naturally in rough rocky places in the countries near the Mediterranean. It is cultivated to some extent in the s. of France.

FRENCH BROAD RIVER: picturesque stream rising in the Blue Ridge Mountains, Henderson co., N.C., flowing n.w. through the Smoky Mountains and Buncombe and Madison cos.; thence into Hamblen co., Tenn., where it receives the Nolichucky river, turns s.w. and joins the Tenn. river 3 m. above Knoxville. It is navigable for steamboats to Danbridge, 30 m., and is about 250 m. long.

FRENCH HON'EYSUCK'LE (*Hedysarum coronarium*): beautiful biennial plant of nat. ord. *Leguminosæ*, sub-ord. *Papilionaceæ*, with branching and spreading stems, pinnate leaves, scarlet or sometimes white flowers, and jointed pods, which have one seed in each articulation. It has fine foliage, and an elegant appearance, and is often seen in flower-gardens. It is a native of the s. of Europe, where it is extensively cultivated as food for cattle. It grows to a height of four or five ft., yields a large crop, and is very nutritious. It is used either green or dried as hay. It requires a rather warm climate for profitable cultivation. The genus *Hedysarum* contains many species, extensively diffused over the warmer parts of the world. A few are found in cold regions, as *H. fruticosum* in Siberia growing in sandy soils, very useful in fixing them by its roots, and valuable as food for horses.

FRENCH LANGUAGE AND LITERATURE.

FRENCH LANGUAGE AND LITERATURE: developed under the combined influence of numerous forms of speech, among which Latin, as in every other tongue of W. Europe, takes a principal part.

The French Language. It appears that in the 4th and 5th c. of the Christian era, the whole of Gallia, from the Rhine to the Pyrenees, had adopted the language of the Roman conquerors, not the polished speech of the classic writers—the *sermo urbanus*—but the form of Latin that had become common to all the subjugated provinces of central Europe—*lingua Romana rustica*. Suetonius, Pliny, Juvenal, and Martial make frequent reference to the Latin in use in southern Gaul and Spain; and in the 4th c. we find that, under Emperor Theodosius, the Roman senate was addressed by an orator of Gaul in rude and uncultured transalpine Latin. At this period, and much later, Latin was employed in the provincial assemblies of Gaul; but in the 7th c., two other forms of speech had come into general use—a provincial dialect of the *lingua Romana*, and a form of German known as the *lingua Theotisca*. The latter which was probably a mingled jargon, used in common by the Frankish and Teutonic tribes, and consequently in vogue in the north and east, received a more definite development under Charlemagne, who caused a grammar of it to be prepared for the use of the schools which he had established, and in which it was taught jointly with Latin. The council of Tours (813) recommended the use both of the rustic Latin and Teutonic dialect; and in 842, in the compact made between the two brothers, Charles the Bald and Louis the German, the former swore in the *Romana rustica*, and the latter in the *Teutsche* language, which, although it had been generally spoken at the court of Charlemagne, had already given place in France to the Frankish form of Latin. This Gallo-Romanic idiom early branched off into the two characteristically different forms of the *Provençal* or *Langue d'oc* of the south, and the *Roman Wallon*, or *Langue d'oïl* of the north. The comparative prosperity which the south of France enjoyed, first under the kings of Arles, and subsequently under the counts of Provence, its freedom from foreign aggression for several centuries, the genial climate, and the more thoroughly Romanized character of the people, led to the early development of the Provençal, and, by the lips of the troubadours, breathed forth a rich melody of song; which, after a time, was re-echoed in less harmonious tones by the *trouvères* of the north in their ruder tongue. The earlier productions of these two schools exhibit striking differences in diction, inflection, and construction; and while the troubadour sang of love, and dwelt on the beauties which a southern climate and a fruitful soil scattered broadcast over the face of nature around him, the northern *trouvère* invented a chivalrous mythology of his own, and ascribed to the heroes of Greece and Rome, and the brethren in arms of King Arthur and Charlemagne, the sentiments of his own times. The use of the northern or Walloon French was considerably extended through its adoption by the Normans,

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who in time carried it under William the Conqueror to England, and, under the northern leaders of the Crusades, to the south and east. In the south, on the contrary, the cruel persecutions of the Albigenses, against which the troubadours inveighed aloud, checked the development of the Provençal language; for the songs of the troubadours were proscribed, and thus the use of the *langue d'oïl* soon extended with the spread of northern power into the provinces of Provence and Languedoc.

French Literature. One of the earliest monuments of the French-Walloon, in the form in which it shows evidence of its gradual development into modern French, is the *Roman de Rou*, a versified chronicle of the exploits of Rollo and his successors, composed by Robert Wace. In this composition, the language is no longer the sonorous, many-vowelled Provençal, or the mongrel Latin of the *lingua rustica*, but a distinct form of speech. The language thus formed by the ingrafting of Norman, Frankish, and Teutonic idioms on the degenerate Latin of the Gallic provinces, was rapidly developed under the fostering influence of the university of Paris and the Sorbonne, which already, in the 13th c., attracted the learned men of all nations to their schools. The *Roman de la Rose*, begun in the 13th c. by Jean de Meung, and completed in the 14th c. by G. de Lorris, and *Guyot's Biote*, belonging to the same period, are typical of the literature of France in the middle ages, which consisted chiefly of tales of chivalry and coarse sallies against the clergy. Froissart's chronicles of the 14th c., which afford a vivid picture of the wars of the English and French, in which he himself was active, are written in a dialect quite comprehensible to the modern student. Comines, 15th c., is a less picturesque narrator; but he may be classed among the earliest true historians of his country, for he was one of the first who observed public events with judgment, and recorded what he had seen in a straightforward, truthful manner. Francis I., by his love of music, song, and dramatic representations, gave indirect encouragement to literature, while the French language acquired force and terseness through the writings of Rabelais, Ronsard, Amyot, and Montaigne; and though, under the regencies of Catharine and Marie de' Medici, Italian writers were more patronized at court than native authors, the language and the literary talent of the nation were undergoing a process of development, which was completed by the establishment under the auspices of Richelieu, of the *Académie Française* 1634. At this period, Corneille brought French tragedy to its highest point of grandeur in the classic style of the drama, which he had adopted. His best pieces are *Le Cid*, *Les Horaces*, *Cinna*, etc. Pascal, in his *Lettres Provinciales*, established a standard of French prose; while Descartes, in his *Discours sur la Méthode*, showed the adaptability of the language to subjects requiring conciseness and precision. A long galaxy of great names gave splendor to the reign of Louis XIV. in every branch of literature. Notwithstanding the frivolity of the habits of the higher classes in France during this

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period, no age produced more vigorous writers or original thinkers. Bossuet and Flechier won respect by their noble funeral orations; Bourdaloue and Massillon, by their eloquent preaching; Fénelon, by his learning and earnest exhortations; and Pascal, by his Christian view of the great questions of human experiences. In dramatic literature, Racine and Molière stand forth conspicuous among a host of lesser writers, the former pre-eminent in tragedy, as his *Andromaque*, *Iphigénie*, *Phèdre*, testify; the latter inimitable in comedy, and exhibiting powers of delineating human character from a humorous point of view, that have never been surpassed. Among his best pieces are *Tartufe*, *Le Misanthrope*, and *Les Femmes Savantes*. La Fontaine is well known among his countrymen alike for his moral Fables and his licentious Tales. La Roche-foucauld and La Bruyère, in their *Sentences* and *Caractères*, depicted human character, with its peculiarities, inclinations, and foibles in strong, humorous, and vivid touches. This was the age of Memoirs and Letters: in the former branch of contemporary history, Cardinal Retz was perhaps the most successful of the host of writers who gained reputation in this special department; while Madame de Sévigné's letters are models of easy epistolary style, and afford a lively picture of the times. This age, in which, at any rate, the *semblance* of religion had been respected, was followed by one of skepticism, infidelity, and philosophical speculations of the wildest kind. Four men of genius, Montesquieu, Voltaire, Rousseau, and Buffon, contributed largely by their writings, and the influence which they exerted on their contemporaries, in bringing about the Revolution. Montesquieu, by his philosophical dissertations on the laws and government of his country, taught the French to take more enlightened views of the rights and duties of different classes of society, and thus naturally roused the angry passions of the oppressed lower orders; while the passionate eloquence of Rousseau won a hearing for doctrines subversive of moral obligations and recognizing no higher standard than human inclinations. Voltaire's versatility of powers, exercised with equal ease, and nearly equal success, on tragedy, satire, romance, poetry, history, and philosophy, enabled him, to the end of his long life, to maintain the supremacy over public opinion, which he had won in his youth. Buffon devoted himself to the study and description of nature, and his *Histoire Naturelle*, which inaugurated a new era in the literature of natural history, is a remarkable monument of the science and learning of that period. Diderot, and D'Alembert the geometer, founded the *Encyclopédie*, which, while it gave a lucid summary of numerous branches of human knowledge, was always hostile to religion. The Revolution, which had been materially accelerated, if not produced, by the inspirations of men of consummate intellect, was not favorable to literature. A period of almost complete intellectual torpor succeeded the active mental development that had characterized the preceding classic and philosophic periods. The Empire was scarcely more propitious to learning; but with

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the *Corinne* *L'Allemagne* of Madame de Staël, and *Les Martyrs* of Chateaubriand, a reaction took place; and these productions of the new romantic school were soon followed by numerous others, either belonging to the same, or to the rival classical school. Among the host of young and original writers who now acquired reputation, were in poetry, dramatic art, and fiction, Victor Hugo, greatest of living French poets, Alfred de Vigny, Frédéric Soulié; and A. Dumas the elder, one of the most prolific of novel-writers, among whose most popular works are—*Les Trois Mousquetaires*, *Le Comte de Monte Christo*, *Le Collier de la Reine*, etc. He published ample reminiscences of his various travels and personal adventures in *Le Caucase*, *Voyage*, *Les Mémoires d'Horace*, *Mémoires de Garibaldi*, the successive volumes of his own *Mémoires*, etc. The catalogue of his writings is scarcely credible for its extent, numbering, it is said, more than 1,200 volumes. Casimir Delavigne has attempted to combine the romantic and classical schools in his *Louis XI.*, *Les Enfants d'Edouard*, etc. George Sand (Madame Dudevant) is one of the most elegant writers of her country, and her works are models of style. Her *Indiana*, which appeared 1832, inaugurated a new era of emotional novel writing, and has had numerous imitators. Among her numerous works, the most popular are *Lélia*, *Mauprat*, *André*, *Consuelo*, and the many pieces which she subsequently wrote for the stage, such as *François le Champi*, *Marquis de Villemer*, etc. *Les Mystères de Paris*, and *Le Juif Errant*, which depict the concealed miseries and depravities of social life, quickly brought their author, Eugène Sue, into notice. The tendency to materialism and sensualism, which characterizes the works of the two writers last named, is more or less perceptible in all belonging to their age in France. Among other recent writers of fiction are Balzac; Gustave Flaubert, co-founder with him of the 'realist' school; A. de Musset, with his unrivalled richness of fancy, and melody of speech; Jules Sandeau; the historian Merimée; Théophile Gautier; Paul de Kock; the literary partners, Erckmann-Chatrian; Edmond About; Dumas the younger, who has latterly written mainly for the theatre; Alphonse Daudet; Cherbuliez, Gaboriau; and the notorious Zola. Scribe and Sardou are successful dramatists. Among critics and essayists are Sainte Beuve, Prevost Paradol, Scherer, Jules Janin, and Edgar Quinet. Till recently, few names in the domain of poetry, beyond those of Béranger, Lamartine, Victor Hugo, De Vigny, Sainte Beuve, and De Musset, were much known out of France; Gautier and De Banville, lyrists of the romantic school, have of late obtained a favorable hearing in many lands; and De Lisle is recognized as the head of a small but popular modern school: Baudelaire and Murger also are notable. Among those who have gained for themselves a world-wide reputation in the department of history, are Barante, whose early work, *L'Histoire des Ducs de Bourgogne*, has been followed by his able histories of the *Convention* and *Directory*. Guizot has shown indefatigable research and a philosophic power of generalization

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In a great number of works, among which the first rank may be awarded to his *Essais sur l'Histoire de France*, and *L'Histoire de la Civilisation en Europe*. Thierry, in his *Lettres sur l'Histoire de France*, and *L'Histoire de la Conquête de l'Angleterre par les Normans*, shows great powers of narration and aptitude for theoretic criticism, perhaps more imaginative than sagacious. Sismondi has shown great research and profound knowledge in his somewhat diffuse History. The late President A. Thiers applied his learning, industry, and powers of delineation to the exposition of the revolutionary and imperial phases of French government. Louis Blanc, in his *Histoire de Dix Ans*, gives one of the most vivid pictures of contemporary History. Lamartine, who carries his poetic inspirations and enthusiastic temperament into his historical researches, presents magnificent but not perfectly trustworthy pictures of history in his *Histoire des Girondins*, *Histoire des Constituents*, and *Histoire de la Restauration*. Villemain, though better known for his history of literature, is yet classed among historians. Michelet is known as the brilliant author of the *Histoire de France*, Martin and Taine are historical writers recently admitted members of the Académie.

There is no department of the moral and physical sciences that has not been enriched and elucidated by the labors of French savans. Among the great scientific writers of modern France, in metaphysics and political economy, are Cousin, Jouffroy, Simon, Lamennais, and Janet, whose eloquent defense of spiritualistic and religious principles reacted strongly against the materialism to which French philosophy had long been addicted; while socialism has found powerful advocates in Comte, St. Simon, Fourier, and Leroux. Chevalier, De Tocqueville, Bonald, Laferrière, and Bastiat are known for their philosophic exposition of the jurisprudence of nations, and the social and political condition of democracy in the new and old world. In philology and ancient history, Champollion, Sylvestre de Sacy, Renan, Remusat, Stanislas Julien, De Rougé, Lenormant, Mariette Bey, and Maspero, by their profound researches into Egyptian and Semitic literature, Accadian (Babylonian) and Chinese civilization, have thrown new light on the origin of races and languages. In mathematics, D'Alembert, Laplace, Lagrange, Biot, Ampère, and Arago stand unrivalled. In natural history, and its kindred sciences, among a host of great French discoverers, are Cuvier, Geoffroy and Isidore St. Hilaire, Blainville, Jussieu, D. Orbigny, Haüy, Gay-Lussac, Elie de Beaumont, Milne-Edwards, Brown-Séguard, Claude Bernard, Berthelot, Dumas, Paul Broca, and Pasteur.

No country has produced a greater number of elegant essayists and literary critics than France, and no language seems to lend itself more readily than French to a concise and graceful, yet forcible style of epigrammatic writing, and few admit of more idiomatic terseness, or greater polish. See Saintsbury's *Short History of French Literature* (1882); the *Histoire de la Litt. Française*, by Nisard (1846), and that by Gérusez (1852); Villemain, *Tableau de la Littér.*

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au Moyen Age (1857); Demogeot, *Hist. de la Littér. Franç.* (1857); Littré's *Histoire de la Langue Française* (1867); Gidel's *Histoire de la Littérature Française* (1875); *La Littérature Française*, Staaff (1869–1873); *History of French Literature*, by H. Van Laun, (1877–79).

FRENCHMAN'S BAY: inlet of the Atlantic Ocean, 30 m. long, average width 10 m., belonging to Hancock co., Me., containing several islands, and having Mt. Desert Island, a noted summer resort, on the w. of its entrance. It affords good harbor to shipping all the year round.

FRENCH POLISHING: common method of coating wood with a fine smooth surface of varnish of gum-lac. Gum-lac is easily soluble in spirits of wine, methylated spirits, or wood-naphtha, and a varnish is thus produced; but when applied simply with a brush, as copal, mastic, and most other varnishes are applied, the result is a rough and broken surface, instead of a smooth continuous polish. To obtain this with a lac-varnish on wood, it is necessary to apply a very small quantity at once, and to rub it continuously until it dries. If a dry rubber be used, the lac sticks to it, and it is dragged from the wood. An oiled rubber is therefore used, and the oil should be a drying oil, such as linseed. Various kinds of rubbers are used; such as a ball of wool covered with rag, a small roll of cloth with the edges downwards, and likewise covered with rag. The varnish and oil may be mixed together in a bottle, shaken up when used, and a little poured upon the rubber; or a simple solution of shellac may be used, and some of this laid upon an oiled rubber. Several successive coats and rubbings are required, and some skill is necessary, to produce a good surface.—The following are some receipts for F. P. for mahogany; they might be multiplied to a great extent, for they should be modified according to the kind of wood to which they are applied, and the mode of applying them: 1. 5 oz. of pale shellac, dissolved in 1 pint of wood-naphtha, or methylated spirit, or spirits of wine. 2. 5 oz. of pale shellac, 1 oz. gum sandarac, 1 pint spirit. 3. 1½ lb. pale shellac, ¼ lb. mastic, 2 quarts spirit. 4. Shellac, 6 oz.; spirit or naphtha, 1 pint; linseed oil, ¼ pint: the last is the most easy to apply; it requires no oil on the rubber, and is a very good domestic polish for restoring furniture, if properly applied by careful and continuous rubbing.

FRENCH POLITICAL PARTIES: see FRANCE.

FRENCH PROTESTANT CHURCH: see HUGUENOTS.

FRENCH RIVER: stream of Upper Canada, empties Lake Nipissing into Lake Huron, entering Georgian Bay, lat. 45° 53' n., and long. 81° 5' w. It has a rapid course of about 60 m. and, toward its mouth, is so uniform in breadth and depth, as to resemble an artificial cut through bare rock. It forms part of the route by which canoes, preferring the Ottawa to the St. Lawrence, pass from Montreal to the Red River of the North.

FRENCH SCOTS GUARD: a body of Scottish knights and soldiers, long an integral part of the French army.

FRENCH SCOTS GUARD.

The alliance of the Scots and the French, never, perhaps, very cordial on either side, lasted nevertheless for a very long period, being maintained by common interest and reciprocal benefits; and is still distinctly traceable in the Scottish language, laws, institutions, and cuisine. This alliance, which originated and developed in the persistent efforts of the Edwards and their successors to subdue both France and Scotland to the English crown, is most conspicuous in the history of the Scots Guards in France, extending over 400 years, 1418-1830, portrayed with fidelity and completeness by Father William Forbes-Leith, s.j. (in *The Scots Men-at-Arms and Lifeguards in France*, 2 vols. 1882). A vivid picture of the theme is presented by Walter Scott in *Quentin Durward*, in Le Balafre of the *auberge* of Plessis, in the veteran Lindsay, and in the other living figures of that romance, which all is based on fact.

In the distracted, almost hopeless, state to which Henry V. of England reduced France in the time of Charles VI., the Scotch archers, who then began to flock to France by way of La Rochelle, the only port not in possession of the English, distinguished themselves as the staunchest element in the French forces, and were the rallying centre of a new army. From 7,000 to 10,000 landed in 1419 under the Earl of Buchan. The great victory of Charles VII. at Baugé 1421, Mar. 22, celebrated in the French court by a whole month's rejoicings, was the achievement of Scotch valor. In that engagement the Duke of Clarence was unhorsed by the Knight of Swinton, and had his death-blow dealt him by the Earl of Buchan, who was rewarded with the highest military office in France—that of Constable. At Verneuil, 1424, the Scots fought to the last with stubborn determination, but the English gained a bloody victory. Soon after this the Scottish gentlemen were constituted the king's special body-guard, and Archibald, Earl of Douglas, who had come over from Scotland at the invitation of the king, was created Duke of Touraine. Of the 15 companies of men-at-arms, the beginning of a standing army, formed by Charles VII., two were exclusively of Scotsmen—'Les Gendarmes Ecossais' and 'La compagnie Ecossaise de la Garde du Corps du Roi.' Subsequently, Louis XII. solemnly recognized 'that the institution of the Scots men-at-arms and the Scots Life-guards was an acknowledgment of their services and their great loyalty and virtue.' To the league against his father, the Dauphin (afterward Louis XI.) tried in vain to gain over the Scots Guards; and after his own accession to the throne, Louis XI. rewarded their constancy by increased pay and privileges. And on two occasions he had them to thank for his personal safety; the first time, after the drawn battle of Montlhéry, when 'the Scots Guards, considering the danger the king was in, took his majesty, who had been in arms all day without eating or drinking, and carried him safe to the castle of Montlhéry;' the second time, when Louis XI. would have fallen in the furious night sortie of the Liégeois against the besieging forces of France and Burgundy, but for the valiant defense of the Scots Guards. In the field of Seminara, when the

FRENCH SETTLEMENTS—FRENCH WAR.

French cavalry were *culbuté* and the Italian rear-guard had fled, the Scots still stood their ground, refusing to fly or surrender, and preferring to be hewn down, as they were to the number of 400. In the wars of Charles VIII., Louis XII., and Francis I., the Scots took a leading part.—After Scotland became Protestant, the alliance with France naturally declined. Yet in the war of Richelieu with the Spanish monarchy we find, besides the Scots men-at-arms under Lord Gordon, the regt. of the *Gardes Ecossoises*, Sir John Hepburn's famous regt. Forbes's corps of infantry and cavalry, and Colonel Douglas's regt. all purely Scotch; and under Louis XIV. the Scots continued to take precedence of the rest of the army, heading the French in all the great battles of that reign—Minden, fought 1759, Aug. 1, being the last in which they figured.

FRENCH SETTLEMENTS IN INDIA: see PONDICHERY.

FRENCH WAR (or OLD FRENCH WAR) IN NORTH AMERICA: 1752-63, caused by boundary disputes between the English colonists and the French. The disputes began to assume threatening form 1749 and culminated in war 1754. The Va. assembly granted £10,000 for frontier defense and 600 men were enlisted Jan.; N. Y. and S. C. raised three companies to aid Va.; the French erected Fort Duquesne on the site of Pittsburg; troops under George Washington attacked the French at Great Meadows and killed many with their commander, Apr. 17; Washington built Fort Necessity, was forced to surrender it; and then built Fort Cumberland; Md. voted £6,000 and N. Y. £5,000 to assist Va., and the British govt. sent over £10,000 and commissioned Gov. Sharpe, of Md. commander-in-chief. In 1755 Gen. Braddock was appointed commander-in-chief, and advancing from Cumberland, Md. against the French at Fort Duquesne was surprised, defeated, and mortally wounded by a combined French and Indian force when within 5 m. of the fort. John Winslow led a force from Boston to Halifax and with Col. Moncton captured the French forts on St. John's river and drove the French from the Bay of Fundy; William Johnson defeated French and Indians under Dieskau at Fort George; Montcalm captured the English forts, garrisons, and ordnance at Oswego 1756, Aug. 14, and Fort William Henry 1757; and the Penn. assembly offered bounties for Indian prisoners and scalps. A force of 50,000 British and colonial troops was raised and put under command of Gen. Abercrombie early in 1758; Gen. Amherst captured Louisburg after a 50-day's siege July 27; Abercrombie made an unsuccessful attack on Ticonderoga July 8, and was succeeded by Amherst; the French fired and abandoned Fort Duquesne Nov. 24, on the approach of Gen. Forbes; and the Indians began to sue for peace. In 1759, July, the French abandoned Ticonderoga and Crown Point to Amherst; William Johnson captured Fort Niagara (24th); Gen. Wolfe defeated the French under Montcalm on the Plains of Abraham Sep.

FRENCH WINES—FRÈRE.

18; and Quebec surrendered to the British Sep. 18. In 1760, Sep., the French gov. surrendered all French ports in w. Canada and returned with his army to France; and the war terminated officially 1763, Feb. 10, when the treaty of Paris was signed. The war cost the colonies 30,000 men and \$16,000,000, of which \$5,000,000 were reimbursed by the British government.

FRENCH WINES: see BORDEAUX: BURGUNDY WINES: CHAMPAGNE (Wine): WINES.

FRENEAU, *fre-nō'*, PHILIP: 1752, Jan. 2—1832, Dec. 18; b. New York: editor and poet. He graduated at Princeton College 1771, engaged in mercantile business, made several voyages to the W. Indies, was captured by a British cruiser and imprisoned 1780, contributed a large amount of prose and verse of a burlesque-political character to the *Freeman's Journal* during the revolutionary war, became editor of the *New York Daily Advertiser* 1790, translating clerk to the state dept. under Sec. Jefferson, and editor of the *Philadelphia National Gazette* 1791. He subsequently published and edited for brief periods the *Jersey Chronicle* at Mount Pleasant, N. J., and the *Time Piece and Literary Companion* at New York, and resumed shipping business. He was a bitter opponent of the Federalists. He translated Robins's *Voyages and Travels* (1783), and published his *Miscellaneous Works* (1788); *Letters on Various Interesting and Important Subjects*, by Robert Slen-der (1799); and three vols. of *Poems* (1786, 95: and 1809).

FRENZY, or **PHRENSY**, n. *frĕn'zĭ* [F. *frénésie*, frenzy—from L. and Gr. *phrĕnĕsis*, madness, delirium—from Gr. *phrĕn*, the mind (see **FRANTIC**): any violent agitation of the mind approaching to madness; delirium: V. to drive to frenzy or madness. **FREN'ZYING**, imp. **FREN'ZIED**, pp. a *-zĭd*, affected with frenzy or madness.—**SYN.** of 'frenzy' madness; insanity; lunacy; derangement; alienation; aberration; ecstasy.

FREQUENT, a. *frĕ'kwĕnt* [F. *fréquent*—from L. *frequens*, or *frĕquen'tem*, often, repeated: It. *frequente*]: often seen; often done; often occurring. **FREQUENT**, v. *frĕ'kwĕnt'*, to visit often or habitually. **FREQUENT'ING**, imp. **FREQUENT'ED**, pp.: **ADJ.** often visited. **FREQUENT'ER**, n. one who. **FREQUENTLY**, ad. *frĕ'kwĕnt-lĭ*, at short intervals; many times. **FRE'QUENCY**, n. *-sĭ* [F. *fréquence*]: occurrence of a thing often, at short intervals. **FREQUENT-ATIVE**, a. *frĕ'kwĕnt'ă-tĭv*, denoting the frequent repetition of an action—a term used in grammar. **FRE'QUENTNESS**, n. quality of being frequent or often repeated.—**SYN.** of 'frequently': often; commonly; ordinary; generally; usually; repeatedly.

FRÈRE, *frĕr*, CHARLES THÉODORE: painter: b. Paris, 1815, June 24. He studied with Coignet and Roqueplan, first exhibited in the French Salon 1834, went to Algeria 1836, was present at the capture of the city of Constantine by the French 1837, and spent many years in African and oriental travel. His paintings obtained a second-class

medal 1848, 65, illustrate the every-day scenes, modes of life, bazaars and noted places and buildings sketched in his travels, and are elaborated with great care and skill especially in colors.

FRERE, *frère*, Sir HENRY BARTLE EDWARD, D.C.L., LL.D.: 1815, Mar. 29—1884, May 29: English diplomatist. He was educated at Haileybury College, for the Indian Civil Service, which he entered 1835. He rose rapidly, and 1850 became chief commissioner of Sind. For his services during the Indian Mutiny he was made a K.C.B., and was twice thanked by parliament. In 1862 he was appointed gov. of Bombay. In 1867 he was gazetted Knight Grand Cross of the Star of India, and was nominated a member of the Indian Council at home. In 1872 he went as special commissioner to Zanzibar, and signed a treaty with the sultan, abolishing the slave-trade. In 1877 he was named gov. and commander-in-chief at the Cape of Good Hope; and it was during this occupancy that the Kafir war of 1877-8 took place, and the Zulu war 1878-9. In these struggles, F.'s support from the British govt. was not prompt and full; yet his vigor and skill at last gave a successful issue. He was recalled soon after Mr. Gladstone came to office 1880. Holder of many honorary titles he was pres. of numerous learned societies (as the Royal Asiatic and the Royal Geographical and the Soc. for the Propagation of the Gospel in Foreign Parts), and wrote a number of works, mainly on themes connected with Christian missions in India and Africa.

FRERE, *frère*, JOHN HOOKHAM: 1769, May 21—1841; b. London: diplomatist and author. He was educated at Eton and Cambridge; in 1796 sat in parliament for a Cornish borough, and with his friend Canning supported the government strongly. He was one of the chief contributors to the *Anti-Jacobin*, contributing *The Loves of the Triangles*, a parody on Darwin's *Loves of the Plants*, and having a share with Canning in *The Needy Knife-grinder*. In 1800 he became plenipotentiary in Lisbon, and two years afterward in Spain, where his position was one of extreme difficulty. He was recalled after the disastrous retreat to Corunna, which was popularly considered a result of his urgent advice to Sir John Moore; this ended F.'s public life. In 1816, he married the dowager countess of Erroll; and four years later, for her health, he went to reside in Malta, where he applied himself to the study of Greek, Hebrew, and Maltese, and was famous for hospitality. He twice declined a peerage. His translations of Aristophanes remain without a parallel or rival in English. Frere's works, with a memoir, were published 1871 by his nephews, W. E. and Sir Bartle Frere.

FRÈRE, PIERRE ÉDOUARD: 1819, Jan. 10—1886, May 28; b. Paris; genre painter. He studied in the School of Fine Arts, and with Delaroche, and first exhibited in the Salon 1843. He received third-class medals 1850, 55, second-class 1852, and the cross of the Legion of Honor 1855. His specialty comprised domestic interiors, scenes and

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manners in humble life, and a variety of child-life episodes; and many of his finest compositions have had wide circulation through lithographs.

FRÉRON, *frā-rōng*, ÉLIE CATHERINE: 1719-1776, Mar. 10; b. Quimper: French writer. He was educated under the Jesuits at the college of Louis le Grand, and became known by his publication of a critical journal 1746, under the curious title, *Lettres de Madame la Comtesse de * * **. It was suppressed 1749, but virtually re-appeared as *Lettres sur quelques Écrits de ce Temps* (13 vols., 1749-54), and was again continued under the title of *Année Littéraire* (1754-76). F. showed intense bitterness against his leading contemporaries. A worshipper of the age of Louis XIV, he hated and satirized the leveling philosophy of his times. Voltaire was the special object of his aversion, and that sensitive scoffer was deeply galled by the weekly diatribes of his antagonist: the names of Voltaire and F. are inseparably, though not amicably, joined in the history of literature. F. was often right in his criticisms and in the accusations which he brought against his adversaries; but opinion in France in the 18th c. was swayed by epigrams, and F. fell a victim to the animosity of the wits, and died of grief.—His son, LOUIS STANISLAS F. (1765-1892), was prominent in the French Revolution, first as a violent radical, later as a re-actionist; and in 1802 was sent as sub-prefect to the island of St. Domingo, by the First Consul, but died two months after his arrival.

FRESCO.

FRESCO, n. *fřēs'kō* [It. *fresco*, fresh]: duskiness like that of the evening or the morning; coolness; a method of painting on walls freshly plastered. **AL FRESCO** [It.]: in the open air. **FRESCO-PAINTINGS**, so named as painted on walls whose plaster is still *fresh* or damp.

FRES'CO, or **FRES'CO-PAINT'ING**, or **PAINT'ING IN FRES'CO**: painting executed on plaster while wet or fresh. Many celebrated artists and well-known writers have maintained that F. is the only way in which the highest efforts in art should be embodied. A very large proportion of the best works of the Italian schools, particularly of Rome and Florence, are in F; and during the present c. it has been revived, and many of the chief paintings of the modern German school are executed in this manner. The practice has to some extent been introduced into Britain, e.g. some works in the new Houses of Parliament. Munich has been the chief home of this revived art.

In this process, first, a cartoon or drawing on paper of the subject is executed with a correct outline, and the shading and effect fully made out. The finished cartoon may be either of the same size as the intended fresco, or on a smaller scale; but, at all events, an *outline* of the same size as the fresco-painting is necessary. When the finished cartoon is made the same size as the fresco, it is generally executed in black and white, with chalk or charcoal, but it is essential to have also a careful study of the subject in colors: this in most cases is on a small scale. The colors used are mostly earths or minerals, as few others will stand the action of lime: these are ground and applied with pure water. The ground to be painted on is the last or smooth coating of plaster that is laid over the rough plaster-work with which walls are prepared. This last coating or ground, or rather as much of it as the artist calculates on being able to cover in one day, is laid on immediately before he begins work. The surface is wet, but firm and smooth; the tracing is laid over the portion prepared, and the artist, with a point of hard wood or bone, goes over the lines of the tracing, and slightly indents them on the plaster. He then proceeds with his work, the finished cartoon and colored sketch being hung or placed near him for guidance. After his day's work is over, any portion of the plaster that has not been painted on, or that may remain beyond or at the edge of his work, is cut away; and next day, when the painter is ready to commence work, the plasterer is at hand, and joins closely another portion of plaster to the edge of the portion painted on the previous day, which, when cut, had been slightly sloped. The lime, in drying, throws out a kind of crystal surface, which protects the color, and imparts a degree of clearness much superior to, and easily distinguishable from, that of a work in tempera or size paint. This process, apparently simple, requires great dexterity and certainty of hand; for the surface of the plaster is delicate, and must not be overworked, besides, the lime imbibes only a certain quantity of additional moisture in the form of liquid colors, after which it loses its crystallizing quality,

and the surface, or a portion of it, becomes what painters call rotten: many frescoes are defective in this way. It is only after the lime has dried that such flaws are discovered; the proper plan, in such a case, is to cut away the defective portion, have fresh plaster laid on, and do the work over again. But the flaws are too often retouched with tempera or size colors; and though they may escape notice for a time, the parts touched will change or come off in a few years. Another difficulty in F. is, that the colors become much lighter after the plaster dries, and allowance must be made for this. However, by practice, the painter may soon overcome this difficulty; and he can test the difference between the color as wet and as dry, by putting a touch on a piece of umber that he usually has at hand, which instantly dries the color, and shows it as it will be when the lime has dried.

The pre-eminence claimed for F. is founded on—1. The quality that it possesses of clearness and exhibiting colors in a pure and bright state. The surface not being dry and dull, as tempera or size color, nor glossy like oil-paintings, is capable of being favorably viewed from any point. 2. Its durability—many frescoes being painted on arcades or the cloisters of churches open on one side, some on the fronts of houses entirely exposed in the open air. 3. The skill and dexterity required in execution—retouching not being admissible, nor those various appliances of glazing over painting, etc., available in working with oil-colors; all which circumstances compel the F.-painter to confine his energy more to the subject and design, than to the mechanical qualities so much sought by painters in oil. The frescoes by Michael Angelo in the Sistine Chapel, by Raphael in the stanze of the Vatican, and those by Correggio in the cupola of the cathedral of Parma, are pointed to by the advocates of this mode of art as settling the question.

But, on the other side, it may be said—1. Though a certain degree of clearness and purity of color results from fresco, it is deficient in depth and richness. The absence of glossiness is no doubt an advantage in the case of mural-painting with reference to architectural decoration; but to a considerable extent this difficulty can be obviated in painting in oil; and Delaroche's great picture of the Hemicycle in the Beaux Arts in Paris, which is in oil is not objectionable on that ground—indeed, many mistake it for fresco. 2. No doubt, in F., the colors are not liable to change much, if the work be executed in pure F. and not retouched; but, generally speaking, the surface is fragile, and easily broken or scratched, and there is no way of mending it but by retouching with tempera colors, and if that be extensively done, its nature is altered, and it becomes a picture in size colors. The *Mudonna de Foligno*, *Mudonna di San Sisto*, *Sposauizia*, and other celebrated easel-pictures by Raphael, are in much better preservation than his frescoes in the stanze of the Vatican. 3. The properties of difficulty in execution and limited range of coloring and of technical appliances, are of a negative

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kind. No doubt, some painters have maintained that good coloring is incompatible with grand compositions; but, in rebuttal, Titian's *Entombment* in the Louvre, and Peter Martyr in Venice, among others, are referred to.

Mural-painting is of great antiquity: in Egypt, in the Etruscan tombs, on the walls of houses in Pompeii, and in the catacombs, are various remains of paintings generally considered frescoes; those in Pompeii, in particular, are remarkable for grandeur and purity of style in design and drawing; but they are executed in a slight and free manner, and on this account, and from the same or nearly similar subjects being often found repeated, are supposed to be copies by house-decorators of celebrated paintings preserved in temples or palaces at Rome. Whether these were frescoes painted on the walls or movable pictures, is matter of dispute. 'The Greeks preferred movable pictures, which could be taken away in case of fire, or sold if necessary.'—Wilkinson on *Egyptian and Greek Paintings*. Pliny says Apelles never painted on walls; and various pictures of immense value are stated to have been taken from Greece to Rome. On the whole, it may be assumed as an opinion long and generally held, that where painting is to be combined with architecture, F. is the style that assimilates most with it. On the other hand, the fact of Delaroche having so successfully executed in the Beaux Arts a work in oil which by size and subject was well adapted for F., and the adoption lately in Germany, and by the artists in the British houses of parliament, of stereochromic painting (see below) in place of F.—a method by which certain defects in the process of F.-painting are said to be obviated—militate against some of the opinions hitherto adopted as to the advantages of F.-painting.

Fresco Secco is a spurious kind of F., much used in Italy in ordinary house-decoration. The colors, mixed in water, are laid on the wall after the plaster is dry, and adhere in a certain degree by absorption, the hard or glassy surface which forms on plaster after it dries being first removed by pumice or otherwise. Pictures executed in this manner appear coarse and dry, or rotten, and are in every way inferior to pure fresco.

Stereochromic Painting [Gr. *stereos*, firm, and *chroma*, color].—The ordinary process of *fresco secco* has lately assumed great importance from a discovery by the late Dr. J. R. von Fuchs, and others, of what is called water-glass (see GLASS, SOLUBLE) which being passed over the surface of a work executed in *fresco secco*, imparts much brilliancy, and fixes and gives great durability to the colors; this method is styled stereochromy, and has been extensively practiced in Berlin by Kaulbach and other eminent German artists. The late Prince Albert was so much impressed by the bearing of this discovery on the art of mural-painting, that he translated from the German a pamphlet describing the 'manufacture, properties and application of water-glass (soluble alkaline silicate), including a process of stereochromic painting,' and printed it for private circulation. Mr. Maclise, R.A., made use of this new style of

FRESCOBALDI—FRESH-AIR FUND.

art in executing his great picture in the palace of Westminster of the '*Meeting of Wellington and Blucher at Waterloo.*'

FRESCOBALDI, *frēs-kō-bál'dē*, GIROLAMO: 1587–1654; b. Ferrara, Italy: organist and composer. He is said to have studied music at his birthplace with Milleville; acquired early celebrity with his rich, strong voice; spent some years in Belgium, and settled in Milan about 1608. In 1627 he removed to Rome, and 1630 became organist of St. Peter's cathedral. That he had acquired wide repute as a virtuoso on the organ is indicated by Baini's statement that 'no less than 30,000 people flocked to St. Peter's on his first appearance there.' His compositions embraced works for the organ replete with the finest results of fugal treatment, a collection of madrigals for five-voices (Antwerp 1608), and numerous vocals, hymns, canzone, and motets. He also was famous as a teacher, and had for a pupil Froberger, celebrated German organist and precursor of Bach.

FRESH, a. *frēsh* [AS. *ferse*; Dut. *versch*; Icel. *frískr*; It. *fresco*; F. *fraîsche*, recent; new: comp. Gael. *fras*, a fall of rain]: cool like the atmosphere during and after rain in warm weather; brisk; moving with celerity; not impaired or faded; not forgotten; not tainted; not stale; recent; healthy in look or feeling; not salt; unpracticed; *familiarly*, tipsy: N. in *OE.*, spring; freshet: V. in *OE.*, to freshen; to refresh. **FRESHLY**, ad. *-lī*. **FRESHNESS**, n. newness; vigor; coolness; ruddiness. **FRESHEN**, v. *frēsh'n*, to make fresh; to grow fresh; to free from salt; to grow brisk and strong, as the wind. **FRESHENING**, imp. a. *frēsh'ning*, making or growing fresh; refreshing. **FRESHENED**, pp. a. *frēsh'nd*, made fresh; deprived of saltness. **FRESH'ES**, n. plu. *-ēz*, the mingling of salt and fresh water in rivers or estuaries. **FRESHET**, n. *-ēt*, the sudden flood in a river from rain or melted snow. **FRESH-BLOWN**, newly-blown. **FRESH MAN**, n. a university student during his first year; a novice. **FRESH SHOT** [a form of *freshet*]: the discharge of a large river into the sea, in consequence of which fresh water is often found on the surface at a distance from the mouth of the river. **FRESH-WATER**, n. water without saltness: **ADJ.** connected with fresh-water; applied to sailors who have not been on long sea-voyages; unskilled; unfamiliar.—**SYN.** of 'fresh, a.': cool; new; recent; unimpaired; untainted; undried; uncured; florid; vigorous; cheerful; unfaded; ruddy; strong; lively; raw; unripe; sound; sweet; good; inexperienced; unused.

FRESH-AIR FUND: money collected to provide poor children of New York with a fortnight's rest in the country during summer seasons. The scheme was projected 1877 by Rev. Willard Parsons, of Sherman, Penn., who selected 60 poor and sick children in New York, took them to his own and his parishoners' homes, and kept them a fortnight free of charge. The New York *Evening Post* took up the work of collecting funds, selecting children, and caring for them, and carried it on under Mr. Parsons' management four years, when (1882) the New York *Tribune* assumed

FRESHWATER HERRING.

charge and with the projector's aid has since maintained it. The fund is raised by voluntary subscriptions and used exclusively to pay the travelling expenses of the children and their attendants, the country people who receive the children into their homes taking them as invited guests, not as boarders. During the 12 years ending with the season of 1888, the fund provided 52,036 children with a fortnight's rest in the country at a cost of \$173,783.20 or \$2.94 per child.

FRESH'WATER HER'RING: see COREGONUS.

FRESH'WATER MUS'SEL: popular name of a whole family of lamellibranchiate mollusks, *Unionidae* (sometimes called *Naiade*), allied to muscles (*Mytilidæ*), but having a much larger foot, which does not generally produce a Byssus (q.v.), except in the very young animal. All the known mollusks of this family are inhabitants of fresh water, some being found in still, and some in running waters. A few species are European; but it is in N. America chiefly that they abound, its lakes and river producing many species. They crawl about by means of the foot; many generally live immersed in mud. They are supposed to feed on animalcules, and on decomposed animal and vegetable matter. The epidermis of many is brilliantly colored, and the inside of the shell is lined with a brilliantly and variously colored nacre, so abundant as to be sometimes used for mother-of-pearl. Pearls are sometimes produced. The most northern European species, found in parts of Britain, and in Norway and Sweden (*Unio* or *Alasmodon margaritifera*, *Mya margaritifera* of Linnæus) inhabits the rivers of mountainous and hilly districts with a rocky bed, and has long been celebrated for the pearls which it produces. It is about $2\frac{1}{2}$ inches long by 5 broad, and has a thick blackish-brown shell, with a toothed hinge. The pearls of the British rivers were famous among the ancient Romans; and Suetonius represents them as having formed an inducement for Cæsar's expedition. Some of the rivers of Wales, and of the n.w. of England and Scotland, have a various times produced beautiful and valuable pearls. In several of the rivers and lochs in Perthshire,



Freshwater Mussel (*Alasmodon margaritifera*).

Scotland, muscle gathering for pearls is a business by which many families get subsistence. A pearl from the Conway, presented by Sir Richard Wynn to the queen of Charles II., is among the ornaments of the British crown. Large and fine pearls have been procured also from rivers of Tyrone and Donegal. See MUSSEL.

FRESHWATER STRATA—FRET.

FRESH WATER STRATA: rocks, named from their supposed origin. This can be easily determined from an examination of the contained fossils. Though the great proportion of aqueous rocks are of marine origin, yet F. S. are occasionally found. The yellow sandstones of the Old Red or Lower Carboniferous period are freshwater beds, as are also the Burdic-House limestone in the Edinburgh coal-field, the Purbeck beds in the Oolite, the Wealden beds in the Chalk, and the Hempstead and other beds in the Eocene period.

FRESISON, n. *frěz-î'zôn* [mnemonic word]: in *logic*, arbitrary name for a mode in the fourth figure of syllogisms, in which figure the middle term is the predicate of the major and the subject of the minor premise. From a universal negative and a particular affirmative, a particular negative is arrived at.

FRESNEL, *frā-něł'*, AUGUSTIN JEAN: 1788, May 10—1827, July 14; b. Broglie, dept. of Eure: French physicist. He was educated at Caen at the École Polytechnique, and at the École des Ponts et Chaussées; and served as govt. engineer. He investigated the polarization of light with so much success, that though in a letter 1814, Dec. 28, he asks a friend to get him some books on the subject, as he did not know what the phrase 'polarization of light' meant ('Je ne sais ce qu'on entend par la polarisation de la lumière'), yet before the end of the following year he ranked among the first authorities on the question. Not knowing, it is said, the result of Young's labors, F. demonstrated to his countrymen the error of the Newtonian theory of the propagation of light by the emission of material particles, and ably advocated the undulatory hypothesis. The result of his researches was exhibited in a memoir, crowned by the French Académie des Sciences 1819. With Arago, he investigated the action of polarized rays of light on each other; and the discoveries, published in a joint memoir, confirmed his previous theory. His practical application of the new theory to the improvement of the light-house system was of incalculable value, and has quite abolished the old method: see **LIGHT-HOUSES**. In 1823, F. was elected a member of the Académie des Sciences; 1825, a member of the Royal Soc. of London, from whom he received, 1827, the Rumford medal.

FRESNO, *frěs'nō*: city of central Cal., capital of Fresno co., 20 m. e. of the San Joaquin river, in a fertile region in which is large cultivation of fruits and grain. The chief industries are sheep-raising, and raisin and wine making. There are several banks, flour and lumber mills, machine shops, and 2 daily and 3 weekly papers. F. is lighted by electricity and has electric street-railroads in operation, the power for which is derived from the San Joaquin falls 40 m. away. Pop. (1900) 12,470.

FRET, v. *frèt* [Bav. *fretten*, to rub; Swiss, *fretten*, to become sore by rubbing: AS. *fretan*, to gnaw: L. *fricārē*: It. *fregare*: comp. Gael. *friotach*, fretful, ill-natured]: to wear away by rubbing; to corrode; to eat away; to be peevish.

FRET—FREUND.

and irritable; to be vexed; to irritate; to vex; to make rough on the surface; to agitate, as water: N. agitation of mind. FRET'TING, imp.: ADJ. wearing away; vexing; eating. FRET'TED, pp.: ADJ. eaten; rubbed or worn away; made rough on the surface; vexed; agitated violently, as by the passions or the wind. FRET'FUL, a. *-fûl*, given to complain of small grievances; irritable; peevish. FRET'FULLY, ad. *-lî*. FRET'FULNESS, n. ill-humor; peevishness.—SYN. of 'fretful': cross; petulant; ill-humored; ill-natured; waspish; captious; splenetic; angry; passionate.

FRET, v. *frèt* [OF. *freter*, to interlace; *frete*, the iron hoop which keeps a wooden tool from riving; *frettes*, an iron grating: It. *ferrata*, the grating of a window: Sp. *fretes*, the bands forming the body of a shield: Sp. *fres*, gold lace: mid. L. *frisum*, lace, ornamented border]: in *her.* and *arch.*, to ornament by interlacing bars or fillets; to variegate; to diversify: N. in *her.*, a figure resembling two sticks laid saltierwise and interlaced with a masche; small bands or fillets interlacing each other at right angles; ornamented work in embroidery or carving. FRET'TING, imp.: ADJ. variegate with bands or fillets. FRET'TED, pp.: ADJ. interlaced; variegate; ornamented with raised or fret work. FRET'TY, a. *-tî*, adorned with fretwork; in *her.*, applied to a shield with six, eight, or more pieces crossing and



Fret.



Fretty.

interlacing. FRETWORK, work adorned with frets; a wood surface cut into a lace-like pattern. FRETTE-ROOF, a roof ornamented by bands or fillets crossing each other in different patterns. FRET'TISED, a. *-tîst*, formed by a collection of frets.

FRET, n. *frît* [L. *frītīnīrē*, to twitter as a swallow: It. *frizzare*, to quaver with the voice: F. *fredonner*, to quaver in singing or playing: comp. Gael. *fraidh*, a partition]: in *OE.*, a note in music; the partitions or marks on the neck of a guitar, a viol, or similar stringed instrument, to guide the fingers in the formation of the notes. *Note.*—Skeat expresses the opinion that FRET 3 is only a particular application of the OF. *frete*, a ferrule or iron hoop.

FREUDENSTADT, *froy'dîn-stât*: pretty town in Würtemberg, 40 m. s.w. of Stuttgart, on a rock washed by the Murg. It was founded 1599 by Duke Frederic I., and peopled by Prot. refugees from Austria. It has considerable trade in wood, cattle, and fruit. Cotton-spinning, weaving, nail-making, etc., are the principal industries. Pop. 6,500, nearly all Protestants.

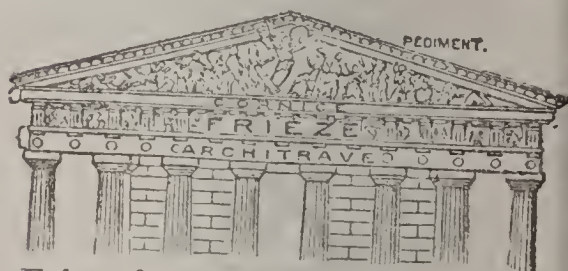
FREUND, *froynt*, WILHELM PH.D.: lexicographer: b.



Fret of Guitar.



Frieze, from Temple on the Illyssus.



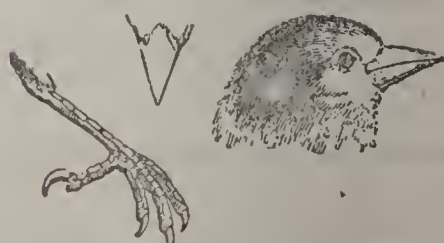
Frieze-front of Parthenon, Athens.



Common Fritillary (*Fritillaria meleagris*).



Assyrian Fringes.—Ancient monuments



Fringillidæ.—Head, Foot, and Bill of a Finch.

FREYCINET—FREYR.

Kempen, Prussia, 1806, Jan. 27. He studied in Breslau, Berlin, and Halle, received his degree and opened an institution for the instruction of young Jews in Breslau 1828, became prof. in a college there and afterward in Hirschberg, spent 1851 in England, became director of a high grade Jewish school established on his plans at Gleiwitz 1855, and retired to Breslau 1870. His works embrace *Wörterbuch der lateinischen Sprache*, 4 vols. (Breslau 1834-45); *Gesamtwörterbuch der lateinischen Sprache*, 2 vols. (1844-5); *Lat.-deutsche und deutsche-lat.-griech. Schulwörterbuch*, 2 vols. (Berlin 1848-55); *Sechs Tafeln zur griech.-römischen u. s. w. Litteraturgeschichte* (Leipsic 1873-75); and *Freund's Schülerbibliothek* (1859-83).

FREYCINET, *frā-sē-nā'*, CHARLES LOUIS DE SAULCES DE: French statesman: b. Foix, 1828, Nov. 14. He was educated in the Polytechnic School, Paris, entered the corps of mines and was employed by the govt. on several important public works 1848, was engineer of mines at Mont-de-Marsan, Chartres (1854), and Bordeaux (1855), director-engineer of the s. system of railroads 1855-61, engaged in scientific and industrial work for the govt. in France and abroad, appointed engineer of the first class 1864, and became a member of the conseil-gen. of the dept. of Tarn-et-Garonne. In 1870 he was appointed prefect of the dept., and was chief of the war dept. under Gambetta 1870-1. He was elected senator 1876, became minister of public works in the Dufaure ministry 1877, and held the office in the ministries of Waddington and Grévy, was appointed pres. of the council and took the portfolio of foreign affairs 1879, Dec. 27, resigned 1880, Sep. 19; was recalled as pres. of the council and again took the direction of foreign affairs 1882, Jan. 31; resigned July 29, was again premier and foreign minister 1885, Apr.—1886, Dec.; was in the ministry a short time 1887, became minister of war under Premier Floquet 1888, Apr. 1, holding office until the resignation of the ministry 1892, Feb. 19.

FREYJA, *frī'ja*, AND FRIGGA, *frīg'ga*: in northern mythology, spoken of as distinct, but originally one, and intimately associated with Freyr. Frigga, in the genealogy of the Ases (q.v.), is the supreme goddess, wife of Odin, and one of the daughters of the giant Hörgwyn, and presides over marriages. Freyja is daughter of Niord, sister of Freyr, and goddess of love. She is drawn on a car yoked with cats; to her, deceased women go, also the half of those that fall in battle, whence she is called Val-Freyja. In this last respect she must be considered as signifying the Earth; but the earth is also represented by Frigga, wife of Odin, and when Freyja seeks Odin, as Isis seeks her Osiris, this is Odin conceived as the Sun. The names also, Frigga and Freyja, are in signification almost alike, and the two are often confounded in mythology. The Anglo-Saxons and Lombards worshipped the wife of Odin as Frea. The name survives in *Friday*.

FREYR, *frīr*: in northern mythology, son of Niord, of the dynasty of the Vanagods. He was adopted with his father among the Ases (q.v.), who, when he got his first

FREYSTADTI—FREYTAG.

tooth, bestowed on him the celestial castle Alfheim. He is the god of peace and fertility; dispenses rain and fruitfulness; and to him prayers for a good harvest are addressed. His wife is Gerda, daughter of the giant Gymer. F. had seen her as he once ascended the lofty seat of Odin, Hlidskialf, from which everything on earth is seen. Gerda was so beautiful, that the brightness of her naked arms illuminated air and sea. Seized with violent love, F. sent Skirnir as spokesman, and for his services had to give him his good sword, which he will miss in the great final contest or eclipse of the gods. Like Freyja, he was the patron of marriage, and probably the two were at one time conceived as united, hermaphrodite-wise. F. was held in great veneration, especially in Sweden, of which he was patron-god, also in Iceland. His chief temple was at Upsala, where a bloody offering was yearly made to him of men and animals. His festival was at the winter solstice, the turn of the year—Yule-tide. While the god was borne round the land, all strife was laid aside. (Does 'the procession of the boar's-head,' at Christmas-time, commemorate F., who rode on the boar, Gullinbursti, and whose symbol was the boar's-head?) The circumstance that the Saxon form of F.'s name, Fro, has been preserved in the German name of a Christian festival, Fronleichnam (*Corpus Christi*, the Lord's body), seems to show that it had become among these peoples the abstract term for a god.

FREYSTADTI, *frīstát-il*, or FREYSTADT, or (Hung.) GALGOCZ: town of Hungary, 84 m. n.w. of Pesth, opposite Leopoldstadt. The Waag is here crossed by a long bridge. F. has a fine castle on a steep limestone cliff. There is also a curious round tower, supposed to have been a Turkish minaret. Pop. 7,000.

FREYTAG, *frī tách*, GUSTAV: dramatic poet and novelist: b. 1816, July 3, at Krenzburg, in Silesia. He studied at the universities of Breslau and Berlin, and took his degree in philosophy 1838. His first important work was a comedy, entitled *Die Brautfahrt, oder Kunz von Rosen* (Breslau 1844). Among his productions are: *In Breslau* (Berlin 1845) a collection of small poems in a popular style; the dramas *Die Valentine* (Leip. 1847) and *Graf Waldemar* (Leip. 1848); and the comedy *Die Journalisten* (1854). An edition of his dramatic works was published at Leipsic in three vols., 1848-50. But his greatest achievement in literature is undoubtedly *Soll und Haben* (Leip. 1855), a novel of German citizen-life. It has been translated into English by Mrs. Malcolm under the title of *Debit and Credit* (1858). In 1859, F. published a new classical drama, *Die Fabier*. A series of prose pictures from German History, entitled *Neue Bilder aus dem Leben des Deutschen Volkes* (Leip. 1862; Eng. trans. *Pictures of German Life*), followed the series, *Bilder aus der Deutschen Vergangenheit*. *Die Verlorene Handschrift* (*The Lost Manuscript*), appeared 1864. The series of tales called *Die Ahnen* includes *Ingo und Ingraban*, *Das Nest der Zaunkönige*, *Die Brüder vom Deutschen Hause*, and *Markus König* (1876). F. has written also on the rules of the drama. In 1870, he retired from the edi-

FRIABLE—FRICASSÉE.

torship of the *Grenzboten*, which he had conducted 23 years. He d. 1895, Apr. 30.

FRIABLE, a. *frī'ă-bl* [F. *friable*—from L. *friābilis*, that can be crumbled to pieces—from *frīō*, I rub, I crumble: It. *friabile*]: easily crumbled; easily reduced to powder. **FRI'ABIL'ITY**, n. *-bīl'ī-tī*, or **FRI'ABLENESS**, n. *-bl-nēs*, the quality of being easily crumbled to powder.

FRIAR, n. *frī'ēr* [F. *frère*, a brother—from L. *frātre*m, a brother]: name common to the members of certain religious orders in the Rom. Cath. Church, and generally employed in distinction from the name Monk (q.v.) and Regular Clerk (q.v.). The name friar, though from its etymology (*frère*, brother) it belongs to the members of all religious brotherhoods, yet has come to be reserved almost exclusively for the brethren of the Mendicant orders, and is applied chiefly to the four great orders Dominicans Franciscans, Augustinians, Carmelites, and later, to the Trinitarians, and to the various branches of these orders. The Franciscans were properly denominated 'Friars Minor' (*Fratres Minores*). The Dominicans received, in contrast, the title 'Friars Major,' which, however, was perhaps rather a sobriquet than a serious name. These several bodies of friars, two, were popularly called, from the color or other peculiarity of their habit, Grey Friars (Franciscans), Black Friars (Dominicans), White Friars (Carmelites) Crutched [or crouched (*Cruciati*, 'crossed')] Friars (Trinitarians), so called from the cross which was embroidered upon their habit. This is the origin of the names of the several localities in London, and other towns thus designated, to the present day. In the orders above referred to, the friars who are in priest's orders are styled 'father'; the other members simply 'brother.' The vow taken by friars at profession is of the class called in the Rom. Cath. Church 'solemn,' and is held to render null and void any contract of marriage entered into by the party subsequently to his religious profession. **FR'ARLIKE** and **FRI'ARLY**, a. *-lī*, after the manner of a friar, or one not experienced in the ways of life. **FRI'ARY**, a. *-ēr-ī*, pertaining to friars: N. a monastery of friars. **FRIAR BIRD**, so called because its head and neck are bare of feathers, one of the family *Meliphogidæ*, or Honey-eaters; found in Australia; called also the Monk, Leather-head, Poor Soldier, Pimlico, and Four-o'clock.

FRI'ARS BAL'SAM: see **BENZOIN**.

FRIBBLE, v. *frīb'l* [prov. F. *friboler*, to flit to and fro without fixed purpose: F. *frivole*, trifling: comp. Gael. *frith*, small, and *buail*, to strike]: to totter like a weak person; to trifle: **ADJ.** silly; trifling: **N.** a trifler. **FRIBBLING**, imp. *frīb'ling*. **FRIBBLED**, pp. *frīb'ld*. **FRIB'BLER**, n. *-lēr*, a frivolous fellow; a trifler.

FRICASSÉE, n. *frīk'ăs-sē* [F. *fricassée*—from *fricasser*, to fry, to stew meat cut into small pieces—from L. *frigo*, I roast, I fry]: a dish made by cutting any kind of flesh or fowl into small pieces, and stewing or frying the same with sauce; a hash: **V.** to dress as a fricassée. **FRIC'ASSEE'ING**, imp. *-sē'ing*. **FRIC'ASSEED'**, pp. *-sēd'*. **FRIC'ANDEAU'**, n. *-ăn-dō'* [F.]: a certain prepared dish of veal.

FRICTION.

FRICTION, n. *frik'shŭn* [*F. friction*—from *L. frictiōnē*, a rubbing—from *fricō*, I rub: *It. frizione*]: the act of rubbing; the resistance produced by the rubbing of bodies against each other; attrition. **FRICTIONAL**, a. *-āl*, relating to friction; moved or produced by friction. **FRICTIONLESS**, a. *-lés*, having no friction.

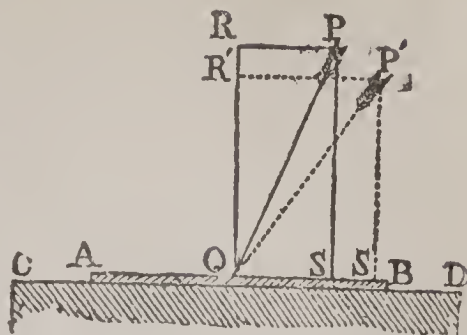
FRICTION: act of, or resistance produced by rubbing of one body or substance against another. As a considerable proportion of the motive-power in all operations is spent in overcoming the F. of the parts of the machine upon one another, and is thus lost for the useful work, it is of great importance to understand the nature of this obstructive force, with a view to reduce it to the least possible amount. The result of many careful experiments is a number of precise and valuable facts or laws regarding F., which are now considered certain. The more important may be thus stated and illustrated.

When a block of oak—say a cubic foot, which weighs about 60 lbs.—is placed on a horizontal table of cast iron, the two surfaces being flat and smooth, it requires a force of nearly $\frac{2}{3}$ the weight of the block, or 24 lbs., pulling horizontally, to make it slide along the table. This measures the F. between the two surfaces. Another block of the same size and shape laid on the same table, would require the same force to draw it; and if the two were laid side by side, and fastened together so as to become one block, it would evidently require double the force, or 48 lbs., to draw the double block; the amount of the F. being thus still $\frac{2}{3}$ of the weight, or of the pressure between the two surfaces. But suppose that, instead of being laid side by side, the second block were laid on the top of the first, what is to be expected? Here the weight is doubled as before, but the extent of rubbing surface remains unaltered; it would be natural, therefore, to expect that this would make a difference, and that, though the F. would, of course, be increased, the increase would be less than in the former case. Experiment, however, shows that there is no difference, and that the F. is just double in both cases. In short, the unexpected and important fact is established, that, *within certain limits, the friction of any two surfaces increases in proportion to the force with which they are pressed together, and is wholly independent of the extent of the surfaces in contact.* The amount of F. between two bodies is thus a constant fraction or proportion of the force with which they are pressed against each other. This fraction differs for the different kinds of surfaces. Thus, between oak and cast iron, it is, as already stated, about $\frac{2}{3}$, or more exactly, .38; for wrought iron on wrought iron (we speak at present of dry surfaces, without grease or unguent of any kind), it is .44; for brass upon cast iron, .22. This constant fraction (expressing the proportion between the pressure of two surfaces and their F.) is called the *coefficient of friction* for these two surfaces.

Another way of illustrating this law of F. is the following, which has an important bearing on the erection of structures, and on mechanics in general. Suppose a slab

FRICTION.

AB, in contact with another slab CD, of the same or of different material; and that a force PQ presses on AB obliquely. Let QR be the perpendicular to the two surfaces, and draw PR, PS parallel to AB and QR, thus resolving the force PQ into two forces, one, PS, pressing AB against CD, the other, PR or SQ, tending to make AB slide towards C. It



will clearly depend upon the strength of F. between AB and CD, how far the force PQ may be made to decline from the perpendicular without actually causing the one body to slide on the other. Suppose that when the pushing force is brought into the position PQ, AB is just ready to slip on CD, and that it is a case of oak upon iron; then, since P'S' or R'Q is the force pressing the surfaces together, and P'R' or SQ the force tending to produce motion, P'R' will be $\frac{2}{5}$ of R'Q. The angle PQR' is called the *limiting angle of resistance* of the two surfaces AB, CD; for so long as the direction of the pressure PQ is within that angle, the F. of the surfaces will sustain it; but if the obliquity is greater, the surfaces will slip. This is true, independently of the extent of the surfaces in contact; and also of the amount of the pressure; for the stability depends upon the proportion of PR to RQ, and that is the same, whatever is the length of PQ, so long as its inclination is the same. If the slab CD were tilted up, so as to form an inclined plane, until AB were on the point of sliding, the angle of inclination would be found to be equal to the limiting angle of resistance RQP'.

Knowing the coefficient of friction of any two substances, their limiting angle of resistance is easily found. *Example.*—The coefficient of brick upon hard limestone is $\cdot 60$; required the limiting angle. Take a line QR' of any convenient length, raise a perpendicular R'P' equal to $\frac{6}{10}$ of QR', and join QP'; R'QP' is the angle required: if measured, it would be found to be about 31° . In any structure, then, the obliquity of the thrust between two surfaces of these materials must always be considerably within this limit, in order to be safe.

The *friction of quiescence*, that is, the resistance to the commencement of motion, is greater than the resistance to its continuance; and the more so if the surfaces have been a considerable time in contact. But the slightest shock or jar is sufficient to destroy this cohesion, or whatever it is that constitutes the peculiar initial resistance; so that it is only the constant and regular F. of motion that is of much consequence in practice.

F. is very much diminished by the use of grease or unguents. The coefficient of wrought iron upon oak, which, in the dry state, is $\cdot 49$, is reduced by the application of water to $\cdot 26$, and by dry soap to $\cdot 21$. The result of experiments on this subject is stated to be, 'that with the

unguents, hog's-lard and olive-oil, interposed in a continuous stratum between them, surfaces of wood on metal, wood on wood, metal on wood, and metal on metal (when in motion), all have very nearly the same coefficient of F. the value of that coefficient being in all cases between '07 and '08.' Tallow gives the same coefficient as the other unguents, except in the case of metals upon metals, in which the coefficient rises to '10. In the case of wood on wood, black-lead is frequently used for the same purpose.

The most important fact, perhaps, and one that could hardly have been anticipated before experiment, is, *that the friction of motion is wholly independent of the velocity of the motion.*

The resistance to the motion of a wheeled carriage proceeds from two sources; the F. of the axle, and the inequalities of the road. The resistance of F. to the turning of a shaft in its bearings, or of an axle in its box, has evidently the greater leverage, the thicker the journal or the axle is; the axles of wheels are accordingly made as small as is consistent with the requisite strength. The resistance that occurs between the circumference of the wheel and the road, constitutes what is called *rolling friction*. There are on all roads, to a greater or less extent, visible rigid prominences, such as small stones, in passing over which the wheel and the load resting on it have to be lifted up against gravity. But even were these absent, the hardest road yields, and allows the wheel to sink to a certain depth below its surface; so that in front of the wheel there is always an eminence or obstacle, which it is at every instant surmounting and crushing down. This is the case even on iron rails, though of course to a much less extent than on any other road. Now, for overcoming this resistance, it can be shown, on the principle of the lever, that a large wheel has the advantage over a small one; and by numerous experiments, the fact has been fully established, that on horizontal roads of uniform quality and material, *the traction varies directly as the load, and inversely as the radius of the wheel.*

The best direction of traction in a two-wheeled carriage is not parallel to the road, but at a slight inclination upward, in proportion to the depth to which the wheel sinks in the road.

On a perfectly good and level macadamized road, the traction of a cart is found to be $\frac{1}{80}$ of the load; that is, to draw a ton, the horse requires to pull with a force equal to 75 lbs. On a railway, the traction is reduced to $\frac{1}{280}$ of the load, or to 8 lbs. per ton.

While F. thus acts as an obstruction to motion, and wastes a portion of the motive-power, it has also important uses. It is, in fact, an indispensable condition, no less than gravity, in the stability of every structure, and in every mechanical motion on the earth's surface. How essential it is to our own movements, we experience when we try to walk on ice. Even on ice there is still considerable F. so that one foot can be slightly advanced before the other; were it altogether annihilated, we could not stir a fraction of an inch, even supposing that we could stand upright.

FRIDAY—FRIEDLAND.

Without *F.* a ladder could not be planted against a wall, unless there were a hole in the ground to retain the foot. In short, no oblique pressure of any kind could be sustained. The advantage of railways consists chiefly in the diminution of *F.* but were this diminution carried much further, there could be no motion whatever, at least by means of locomotives. Without considerable *F.* the driving-wheels of the locomotive would slide round on the rails without advancing; and this sometimes happens, when particular states of the weather render the rails as if they were greased.

The force of *F.* is often directly employed in mechanics; for instance, to communicate motion by means of belts, chains, etc. *F.* is the force that holds a knot. It is specially useful when a machine, with great momentum, has to be checked or arrested in its motion. The best example of this is the *break* used on railways. By means of a system of levers, blocks of wood are made to press against the circumferences of a number of the carriage-wheels; and thus the momentum of a train weighing hundreds of tons, and moving with a velocity of perhaps 50 m. an hour, is gradually destroyed in a surprisingly short time.

Friction-wheels are used to diminish the *F.* of axles on their supports. Two wheels, of large circumference in proportion to their weight, are placed close together, parallel to each other, and so that the one seems to overlap the half of the other; in the notch thus formed by the upper circumferences of the wheels one end of the axle rests; a similar arrangement being made for the other end. The *F.*, which formerly acted directly on the axle, is by this arrangement referred to the axles of the *F.*-wheels, and is, by the laws of mechanics, reduced in the ratio of the circumference of the *F.*-wheel to the circumference of its axle. In order to render the *F.* of the *F.*-wheels themselves the least possible, they are made as light and as large as is practicable.

FRIDAY, n. *frī'dā* [A.S. *frige-dæg*—from *frigu*, love, the goddess of love: Icel. *frjádagr*: Gr. *frey-tag*]: sixth day of the week, supposed to have been so named from *Frigga* or *Freya*, the Saxon Venus; observed as a day of abstinence in the Rom. Cath. and other prelatical churches generally, in memory of Christ's crucifixion. The superstition that Friday is an 'unlucky day,' which may have arisen from its association with the crucifixion, is remarkably disproved by numerous successful achievements historically recorded as occurring on that day. **GOOD FRIDAY**, the day observed in most Christian churches as that of our Lord's crucifixion.

FRIED: see under **FRY** 1.

FRIEDEBERG, *frē'dēh-bērĕh*: walled town of Prussia, province of Brandenburg, 56 m. n.e. from Frankfurt, on the Peza. Around it are several lakes. It has woolen manufactories and tanneries, and some trade in cattle. Pop. about 6,500.

FRIEDLAND: town in Bohemia, on the Wittig, near

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the Prussian border; cap. of a dist. or duchy of the same name, from which the famous Wallenstein (q.v.) took his title of Duke of Friedland. Pop. of town (1890) 5,282.

FRIEDLAND, *fréd'land* or *frët'lánt*: small town of east Prussia, in the circle of Königsberg, on the left bank of the Alle, 26 m. s.e. of Königsberg; lat. 54° 26' n., and long. 21° e. The people are employed in linen-weaving. F. is famous for Napoleon's victory there 1807, June 14, over the Russian forces under Bennigsen. The Russian general found himself unable to cope successfully with an army of 80,000 men, as his own force consisted of less than 50,000 horse and foot; and he was forced to retire after a disastrous battle. He fell back on the town of Tilsit, on the Niemen, where the treaty between the French and Russian emperors and the king of Prussia, known as the treaty of Tilsit, was drawn up. Pop. (1890) 4,000.

FRIEDLAND, *frët'lánt*, VALLENTIN, generally called, from his birthplace, *Trotzendorf*: 1490, Feb. 14—1556, Apr. 26; b. in Upper Lusatia: indisputably the greatest educationist of his age. After the death of his father, 1513, he went to Leipsic, where he studied under the celebrated Peter Mosellanus and Richard Crocus. On the dawn of the Reformation, he went to Wittenberg, where he formed a close intimacy with Luther and Melanchthon, and learned Hebrew from a converted Jew. In 1523, he went to Goldberg, in Silesia, as rector of the gymnasium there; left after four years, but returned 1531, and showed great energy in improving the organization of the school, which soon acquired a rare celebrity. Not only from Silesia, but also from Poland, Lithuania, Austria, Bohemia, Hungary, and Transylvania, pupils sought it in great numbers. Often more than 1,000 attended at a time, who all dwelt together in buildings set apart for the purpose, and were admirably superintended and drilled. F. had a wonderful belief in the efficacy of knowledge, and, in particular, placed so high a value on clearness of thought and expression, that he was wont to affirm that only rogues were unintelligible. See the biographies by Pinzger (1825) and Löschke (1856).

FRIEDLÄNDER, *frët'lënt-er*, MICHAEL: Hebrew scholar; b. Introschin, Prussia, 1833, Apr. 29. He studied in Berlin with Prof. Bollermann 1851-56, then entered Berlin Univ.; also studied Hebrew theol. with Rabbis Oettinger and Rosenstein, and graduated at Halle 1862. He became director of the Berlin institute for the teaching of the Talmud, and, 1865, principal of the Jews' College. He is a member of the Soc. of Hebrew Literature, and under its auspices published *The Commentary of Ibn Esra on Jesaiah, edited from MSS. and translated with Notes, Introduction, and Glossary*, 3 vols. (London 1873-77); *The Book of Jesaiah, the Anglican Version, emended according to the Commentary of Ibn Esra*; *The Hebrew Text of Ibn Esra's Commentary on Jesaiah, edited according to MSS. and accompanied by a Glossary, with Short Dissertations on Subjects connected with the Commentary* (1874); *Essays on the Writings of Abraham Ibn*

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Esa (1877); *The Guide of the Perplexed of Maionides, translated from the Original Text, and Annotated* (1881); and *The Jewish Family Bible, containing the Pentateuch, the Prophets, and the Hagiographa, Hebrew and English* (1882).

FRIEDRICH, frĕd'rĭch, JOHANN: formerly a Rom. Cath. theologian, who with Dr. Döllinger (q.v.) led in the formation of the Old Catholic Church; b. Franconia, Germany, 1836. He was ordained a Rom. Cath. priest 1859; became a prof. of theology at Munich 1865, and member of the Acad. of Sciences 1867. He was at the Vatican Council 1870. Subsequently he took strong ground against the modern claims of the papacy, and was excommunicated. Many of his controversial articles were published in the *Allgemeine Zeitung*. His most noted work is *Kirchengeschichte Deutschlands*. See OLD CATHOLICS.

FRIEND, n. frĕnd [Goth. *frijonds*, a friend—from *frijon*, to love: Ger. *freund*, a friend: AS. *freond*—from *freon*, to free, to love]: one attached to another by sentiments of affection, esteem, or respect; one not hostile; an associate; a term of respectful salutation or address, as 'my friends': V. to become a friend; to befriend. FRIEND'LIKE, a. FRIEND'LESS, a. without a friend. FRIEND'LESSNESS, n. FRIEND'LY, a. -lĭ, disposed to, as a friend; amicable; favorable: AD. after the manner of a friend; amicably; in union. FRIEND'LINESS, n. a disposition to favor or befriend; goodwill. FRIEND'SHIP, n. intimacy or attachment depending on mutual respect and esteem; personal kindness; friendly aid. FRIENDS, the religious body or society usually called Quakers (see FRIENDS, SOCIETY OF). A FRIEND AT COURT, one who has ability or interest to serve us.—SYN. of 'friendly, a.': kind; propitious, conciliatory.

FRIEND'LY ISL'ANDS (as distinguished from the Fiji Islands (q.v.), which are generally reckoned a part of them), otherwise styled the TONGA GROUP: islands s.e. of Fiji. They consist of three sub-groups, of which abt. 30 islands are inhabited, Tonga-tabu being the largest. The great majority are of coral formation; but some are volcanic, and there are several active volcanoes. The people are the most intelligent and skilful of the fair Polynesians, but are decreasing in numbers. A treaty with Germany 1876 granted that empire a coaling-station; and a treaty with Great Britain was concluded 1879. The F. I. were discovered by Tasman 1643, but received their collective name from Cook. Both these navigators found the soil closely and highly cultivated, and the people apparently unprovided with arms. The climate is salubrious, but humid; earthquakes and hurricanes are frequent, but the former are not destructive. Among the products of the islands are yams, sweet-potatoes, bananas, cocoa-nuts, bread-fruit, sugar-cane, the *ti*, hog-plum, etc.; some corn also is grown. The Flora resembles that of the Fiji group; but the native animals are very few.

The F. I. were visited by missionaries first in 1797. In 1827 the work of evangelization fell into the hands of the Wesleyan Methodists, and after a lengthened and perilous

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struggle with the savage paganism of the inhabitants, it achieved success. Almost all the islanders now are Christians; great numbers can speak English, and, in addition, have learned writing, arithmetic, and geography; while the women have been taught to sew. The various islands were governed formerly by independent chiefs, but nearly all are now under the rule of one chief, called King George, who is not only a Christian, but a zealous preacher of the gospel. Pop., formerly reckoned at 40,000, is now abt. 10,000.

FRIENDLY SOCIETIES: associations, usually among operatives, for relief of the members in illness or in lack of work. Trades-Unions (q.v.) also have such relief as one of their objects, but their chief feature is combination against oppression which is felt or feared from capital.

F. S. had their prototypes in the cases, boxes, and chests, or kists—as they were called in Scotland and Germany—of the guilds and corporations of medieval Europe; which were funds not only for maintaining the dignity and ministering to the conviviality of society, but were accumulated to provide for the aged and the sick. Mr. Turner finds them in Anglo-Saxon England, and, like the other institutions connected with municipal life, they probably formed part of the legacy of the Romans to the Teutonic conquerors of Europe. F. S. are a form of mutual insurance, and, like all insurances, they depend on the principle of substituting the certainty which attends the fortunes of large numbers of men for the uncertainty which belongs to the fortune of each. Their main objects are the securing, in virtue of a small periodical payment during health and vigor, of a weekly sum during sickness, a sum to cover funeral expenses at death, and sometimes of a pension after a certain age. In some respects, therefore joining a friendly society is better than becoming a depositor in a savings-bank. Sickness may come before the savings are considerable; or, if considerable, they may be melted away by a long-continued sickness; but after the first weekly payment is made to a friendly society, the member is secure of succor, at least for a time, and he has, perhaps, other advantages. It is possible, on the other hand that a member may find difficulty in certain circumstances, in keeping up the weekly or other periodical payments required, and in this case, in most societies, he altogether forfeits the expected benefits.

It is to be regretted that, of this excellent class of institutions, many are founded on erroneous principles, or rather on no principles at all; and it often happens, therefore, that those who trust to them are disappointed, the funds falling short before all claims are satisfied. In former years no proper calculations for F. S. existed; but sound calculations are now attainable on the average amount of sickness incident to human life—based on investigation of a large number of cases through a considerable term of years. An English estimate of high repute is that by Mr. Neison, of 'sickness experienced in *weeks* in passing through different periods of life': age 20–30 years, 8·7; 30–40, 9·9;

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40-50, 14·8; 50-60, 27·1; 60-65, 26·6; 65-70, 50·7; 70-75, 84·9; 75-80, 120 5.

One great mistake in the formation of F. S. is to assume that each member should pay an equal sum, whatever his age may be. This is unjust to the younger members, who are less likely to become burdensome to the funds than the middle-aged; and, indeed, there is a rising scale of probability of sickness through all the years of a man's life. It is, however, well to remember that as sickness varies more considerably than mortality with the salubrity of the localities inhabited and the occupations of the members, no absolute reliance can be placed on published averages. All of them, however, agree in this, that *increase of years is attended by increased liability to sickness*. Now, a rightly constituted friendly society is bound to take this circumstance into account. To admit all ages at an equal payment, is clearly making the younger members pay for the elder. — Another great error in the constitution of F. S. is in making them for a year only, as is popular among the less intelligent people in the north of England. These yearly societies are, indeed, in every point of view a most objectionable class of institutions, to which working-people would never resort except through ignorance.

A well-constituted friendly society involves, in the first place, the principle of payments appropriate to particular ages, as no other plan can be considered equitable. It stands forth before the working-classes as a permanent institution, like the life-assurance societies of those who have more money in hand, and necessarily requires its members to consider their connection with it as enduring, because its grand aim is expressly to make provision, at one period of life, for contingencies which may arise at another—for youth, in short, to endow old age. By a yearly society a man is left at last no better than he was at first, as far as that society is concerned; but the proper friendly society contemplates his enjoying a comfortable old age, from the results of his own well-applied earnings.

It is essential to the character of a proper benefit society that individuals be not admitted indiscriminately. To take a person in bad health, or of broken constitution, is unjust to healthy members, because he is obviously more likely to be a speedy burden upon the funds. Here, as in life-assurance societies, it is necessary to admit members only upon evidence that they are of sound constitution and in good health. And it may be well to grant no benefits until after the member has been a year in the society. By these means, men are induced to enter when they are hale and well, instead of postponing the step until they have a pressing need for assistance, when their endeavor to get into a friendly society becomes a fraud.

F. S. in the United States may wisely avail themselves of tables formed under the sanction of the English government, by John Tidd Pratt, late registrar of F. S. in England, and by Dr. Farr, actuary of the English registrar-general. The former, with useful instructions in the book-keeping of F. S. are embodied in the reports by Mr. Pratt,

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printed by order of the house of commons for 1856, 7; and the latter, with a masterly essay on the mathematical treatment of the subject, are contained in the 12th report of the registrar-general.

We have an idea of a friendly society in its simplest form, if we suppose a hundred men of 35 years of age, to associate, and make such a payment at first as may be sure to afford each man that shall fall sick during the ensuing year a half-dollar a day during his sickness. Taking, for illustration, Mr. Neison's Tables, we find that, among such a body of men, there will be nearly 100 weeks of illness in the course of the year. This, multiplied by 7, gives the whole sum required, \$350, or \$3.50 from each member, which, less by a small sum for interest, will accordingly be the entry-money of each man. A society of individuals of different ages, each paying the sum which would in like manner be found proper to his age, would be quite as sound in principle as one on the above simple scheme. It is only a step further to equalize each man's annual payments over the whole period during which he undertakes to be a paying member.

A point for consideration is the investment and improvement of the funds of a society. In many cases, it is best to rest content with depositing the money in the public funds or the savings-banks, thus ensuring at least a moderate interest. Some of the societies have sums invested with the commissioners for the reduction of the national debt. But circumstances may warrant an investment with local building societies, or in corporation debentures, or in other ways which afford a better rate of interest with safety; and the tendency to abandon the old routine of merely savings-bank deposit seems generally growing.

In 1882, in Great Britain, the non-registered F. S. had about 5,000,000 members, the registered about 2,000,000.— See BUILDING SOCIETIES: CO-OPERATION: TRADES UNIONS.

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FRIENDS, *fřendz*, **SOCIETY OF**: proper designation of a sect of Christians, better known as Quakers; founded by George Fox (q.v.). In spite of severe and cruel persecutions, the S. of F. succeeded in establishing themselves both in England and in America. Their founders were not open to the charge of fanaticism; but a few of the early followers of the doctrine, were, as in other companies newly gathered, persons of unbalanced minds, who roused popular indignation by unseemly antagonism to almost all usages in church and state—not seldom carrying their opposition to the point of serious disturbance of the public peace, and to a defiance of authority and an actual courting of martyrdom. This line of action gave occasion, though not any excuse, to the persecution of a few members of this sect in the early Massachusetts history. But though the great body of the Friends were pure and calm and Christian, while unyielding, they suffered severe persecution in Britain, where (1650–89) 14,000 were fined and imprisoned, and 369 died in jail. After the date mentioned the persecution ceased in Britain and America. The Friends have never been numerically powerful (having at no time exceeded 200,000 members in all lands); but the purity of life which from the beginning has honorably distinguished them as a class, has unquestionably had a salutary influence on the public at large; while in respect to certain great questions affecting the interests of mankind, such as *war* and *slavery*, they have, beyond all doubt, originated opinions and tendencies which, whether sound or croneous, have widely leavened the mind of Christendom. For an account of the more eminent representatives of the Friends, see **BARCLAY**: **FOX**: **PENN**: **ETC.** Their doctrine, practice, and discipline, as laid down in their own publications, is summarized as follows.

1. *Doctrine*.—It is perhaps more in the *spirit* than in the *letter* of their faith that the S. of F. differ from other Christians. They themselves (excepting a portion who hold a general Unitarian view) assert their belief in the great fundamental facts of Christianity, and even in the substantial identity of most of the doctrinal opinions which they hold with those of the evangelical denominations. The Epistle addressed by George Fox and other Friends to the gov. of Barbadoes, 1673, contains a confession of faith not differing materially from the so-called Apostles' Creed, except that it is more copiously worded, and dwells with great diffuseness on the internal work of Christ. The Declaration of Christian Doctrine on behalf of the Society 1693, expresses a belief in what is usually termed the Trinity, in the atonement made by Christ for sin, in the resurrection from the dead, and in the doctrine of a final and eternal judgment; and the Declaratory Minute of the yearly meeting 1829 asserts the inspiration and divine authority of the Old and New Testament, the depravity of human nature consequent on the fall of Adam, and other characteristic doctrines of Christian orthodoxy, adding: 'Our religious Society from its earliest establishment to the present day, has received these most important doctrines of Holy Script-

ture in their plain and obvious acceptation.' It is nevertheless certain that uniformity of theological opinion cannot be predicated of the Friends, any more than of other bodies of Christians. As early as 1668, William Penn and George Whitehead held a public discussion with a clergyman of the English Church, named Vincent, in which they maintained that the doctrine of a tri-personal God, in the form held by that church was not found in the Scriptures, though in what form they accepted the doctrine themselves does not appear; and some time later, Penn published the *Sandy Foundation Shaken*, in which, among other things, he endeavored to show that the doctrines of vicarious atonement and of imputed righteousness did not rest on any scriptural foundation. But in general, the S. of F., in the expression of their belief, have avoided the technical phraseology of other Christian churches, restricting themselves with commendable modesty to the words of Scripture itself, as far as that is possible, and avoiding, in particular, the knotty points of Calvinistic divinity (see Barclay's *Catechism and Confession of Faith* (1673), in which the answers to the questions—to avoid theological dogmatism—are taken from the Bible itself). This habit of allowing to each individual the full freedom of the Scriptures, has, of course, rendered it all the more difficult to ascertain to what extent individual minds, among the Society, may have differed in their mode of apprehending and dogmatically explaining the facts of Christianity. Their principal distinguishing doctrine is that of the 'Light of Christ in man,' on which many of their outward peculiarities, as a religious body, are grounded. The doctrine of the internal light is founded on the view of Christ given by the apostle John, who, in the first chapter of his gospel, describes Christ—the Eternal Logos—as the 'life' and 'light of men,' 'the true light,' 'the light that lighteth every man that cometh into the world,' etc. Barclay taught that even the heathen were illumined by this light though they might not know—as, indeed, those who lived before Christ *could* not know—the historical Jesus in whom Christians believe. In their case, Christ was the light shining in darkness, though the darkness comprehended it not. The existence of 'natural virtue' (as orthodox theologians were used to term it) among the heathen was denied by Barclay, who regarded all such virtue as Christian in its essence, and as proceeding from the light of Christ shining through the darkness of pagan superstition. These opinions seem to be somewhat freer than those expressed in the General Epistle of the Society in England (1836), wherein they refuse to acknowledge 'any principle of spiritual light, life, or holiness inherent by nature in the mind of man,' and again assert, that they 'believe in no principle whatsoever of spiritual light, life, or holiness, except the influence of the Holy Spirit of God bestowed on mankind in various measures and degrees through Jesus Christ our Lord;' but, on the other hand, in a little treatise published by the Society 1861, it is affirmed that 'the Holy Spirit has always been afforded in various measures to mankind;' while stress is laid on the statement

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of the apostle Paul, that 'the grace of God (understood by Friends to signify the 'operation of the Divine Spirit') that bringeth salvation, *hath appeared to all men*;' while another exponent of their views, T. Evans of Philadelphia (see *Cyclopædia of Religious Denominations*, Lond. Griffin & Co. 1853), states that 'God hath granted to all men, of whatsoever nation or country, a day or time of visitation, during which it is possible for them to partake of the benefits of Christ's death, and be saved. For this end, he hath communicated to every man a measure of the light of his own Son, a measure of grace, or the Holy Spirit, by which he invites, calls, exhorts, and strives with every man, in order to save him; which light or grace, as it is received, and not resisted, works the salvation of all, even of those who are ignorant of Adam's fall, and of the death and sufferings of Christ; both by bringing them to a sense of their own misery, and to be sharers in the sufferings of Christ inwardly; and by making them partakers of his resurrection, in becoming holy, pure, and righteous, and recovered out of their sins.' Hence it may be safely asserted that they hold a broader view of the Spirit's working than has, till recently, been held largely or definitely by any other Christian denomination.

In America, about 1827, Elias Hicks, a Friend of remarkable powers, made a schism in the Society, by the promulgation of opinions denying the miraculous conception, divinity, and atonement of Christ, and the authenticity and divine authority of the Holy Scriptures. About one-half of the society in America adopted the views of Hicks, and are known as Hicksite Friends; their opinions, of course, are repudiated by the rest of the Society, who are sometimes described as Orthodox (better, Evangelical) Friends. The Hicksite schism thoroughly alarmed the evangelical party both in England and America; and a movement was begun in favor of education, of a doctrinal belief more nearly allied to that of the so-called 'Evangelical' churches, and of a relaxation in the formality and discipline of the Society. The leader of this movement was Joseph John Gurney, of Norwich, England. This new tendency, however, excited—by its influence toward weakening the formal bonds of the Society—considerable opposition among some of the Friends in America; and the consequence was a division among the Evangelical Friends themselves, and the formation of a new sect, called 'Wilburites,' after the name of their founder, John Wilbur, who are noted for the strictness with which they maintain the traditions and peculiarities of the Society. (See *Friendly Sketches in America*, by William Tallack. Lond., Bennett 1862.) Some slight indications of theological differences have manifested themselves in England also.

2. *Practice*.—It is in the application of their leading doctrine of the 'internal light' that the peculiarities of the Friends are most apparent. Believing that it is the Holy Spirit, or the indwelling Christ of God, that alone maketh wise unto salvation, illumining the mind with true and spiritual knowledge of the deep things of God, they do not

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consider 'human learning' essential to a minister of the gospel, and look with distrust on the method adopted by various churches for obtaining such—viz, by formally training after a human fashion a body of youths chosen without evidence of a clear inward call of God. They believe that the call to this work now, as of old, is 'not of men, neither by man, but by Jesus Christ, and God the Father;' and that it is bestowed irrespectively of rank, talent, learning, or sex. Consequently, they have no theological halls, professors of divinity, or classes for 'students.' Further, as fitness for the ministry is held to be a free gift of God through the Holy Spirit, so, they argue, it ought to be freely bestowed, in support of which they adduce the precept of the Saviour—'Freely ye have received, freely give;' hence those who minister among them are not paid for their labor of love, but, on the other hand, whenever such are engaged from home in the work of the gospel, they are, in the spirit of Christian love, freely entertained, and have all their wants supplied; in short, the Friends maintain the absolutely voluntary character of obligations to religious services in public, as being properly performed only under an immediate impression of duty; and that Christians should do all for love, and nothing for money. It also follows from their view of a call to the work of the ministry, that women may exhort as well as men, for the 'spirit of Christ' may move them as powerfully as the other sex. The prophecy of Joel as applied by Peter is cited as authority for the preaching of women: 'On my servants and on my handmaidens I will pour out in those days of my spirit, and they shall prophesy.' They adduce also the New Testament examples of Tryphæna, Gryphosa, the beloved Persis, and other women who appear to have labored in the Gospel. Their mode of conducting public worship likewise illustrates the entireness of their dependence on the 'internal light.' In other religious bodies, the minister has a set *form* of worship, through which he must go, whether he feels devoutly disposed or not. This seem objectionable to the Friends, who meet and remain in silence until they believe themselves moved to speak by the Holy Spirit. Their prayers and praises are, for the most part, silent and inward. They prefer to make melody in their hearts unto God, considering this to be more spiritual than the outward service of the voice.

The doctrine of the 'internal light' has led the Friends also to reject the ordinances of Baptism and the Lord's Supper in the form observed by other Christians. They believe the Christian baptism to be a spiritual one, and not with water, like the Jewish and heathen baptisms; in support of which they quote, among other passages, the words of John the Baptist himself: 'I baptize you with water, but there cometh one after me who shall baptize you with the Holy Spirit and with fire.' Similarly do they regard the rite of the Lord's Supper: It is, say they, inward and spiritual, and consists not in any symbolic breaking of bread and drinking of wine, but in that daily communion with Christ through the Holy Spirit, and through the

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obedience of faith, by which the believer is nourished and strengthened. They believe that the last words of the dying Redeemer on the cross, 'It is finished,' announced the entire abolition of symbolic rites; that under the new spiritual dispensation then introduced, the necessity for rites as a means of arriving at truth or of offering worship, ceased, and that their place has been abundantly supplied by the Comforter, the Holy Spirit, whose office it now is to lead and guide men into all truth. The true Christian supper, according to them, is set forth in the Book of Revelation—'Behold I stand at the door and knock; if any man hear my voice and open the door, I will come in unto him, and will sup with him and he with me.' For the same reason—viz., that the teaching of the Spirit is inward and spiritual—the Friends ignore the religious observance of days and times, though some at least among them regard the Lord's Day, known often as the Sabbath, of perpetual obligation.

The taking or administering of oaths is regarded by Friends as inconsistent with the command of Christ, 'swear not at all,' and with the exhortation of the apostle James—'Above all things my brethren, swear not, neither by heaven, neither by the earth, neither by any other oath; but let your yea be yea; and your nay, nay; lest ye fall into condemnation.' They have refused also to pay tithes in Britain for the maintenance of what they hold to be a hireling ministry, believing that Christ put an end to the priesthood and ceremonial usages instituted under the Mosaic dispensation, and that he substituted none in their place but left men to the inward work of His Spirit. In consequence all consistent Friends in Britain, have been regularly mulcted of plate, furniture, or other goods, to the value of the amount due. The recent conversion of tithe into *rent charge*, however, has, in the opinion of many Friends, largely removed objections to the payment to this ecclesiastical demand. In regard to the civil magistracy, while they respect and honor it, as ordained of God, they are careful to warn the members of their Society against thoughtlessly entering on its responsibilities, involving as it does the administration of oaths, the issuing of orders and warrants in reference to ecclesiastical demands, the calling out of an armed force in cases of civil commotion, and other duties inconsistent with the peaceful principles of the Society. The Friends have likewise consistently protested against war in all its forms; and the Society has repeatedly advised its members against aiding and assisting in the conveyance of soldiers, their baggage, arms, ammunition, or military stores. They regard the profession of arms and fighting, not only as diametrically opposed to the general spirit of Christ, whose advent was sung by angels in the words: 'Glory to God in the highest, and on earth peace, good-will toward men;' but as positively forbidden by such precepts as—'Love yo'r enemies, bless them that curse you, do good to them that hate you, and pray for them which despitefully use you and persecute you;' also, 'Resist not evil; but whosoever shall smite thee on thy right cheek, turn to him the other also;' and

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while they acknowledge that temporary calamities may result from adopting this principle of non-resistance, they have so strong a faith in its being essentially the dictate of divine love to the Christian heart, that they believe God, by his wise and omnipotent providence, could, and will yet make it 'mighty to the pulling down of the strongholds of iniquity.' The world, they believe, will by and by confess that the peace-makers are most truly the children of God. The efforts of the Society for the emancipation of the slaves are a part of modern history in Britain and the United States. They may certainly claim to have cultivated the moral sense of their fellow countrymen on this important question. As early as 1727, they began to 'censure' the traffic in slaves, as a practice 'neither commendable nor allowed,' and gradually warmed in their opposition, until the whole British nation felt the glow, and entered with enthusiasm on the work of abolition. In respect to what may be called minor points also, the Friends are very scrupulous; they object to 'balls, gaming-places, horse-races, and playhouses, those nurseries of debauchery and wickedness, the burden and grief of the sober part of other societies as well as of our own.' The Printed Epistle of the British yearly meeting 1854 contains a warning against indulging in music, especially what goes by the name of 'sacred music,' and denounces musical exhibitions, such as oratorios, as essentially a 'profanation'—the tendency of these things being, it is alleged, 'to withdraw the soul from that quiet, humble and retired frame in which prayer and praise may be truly offered with the spirit and with the understanding also.' They object, besides, to 'the hurtful tendency of reading plays, romances, novels, and other pernicious books;' and the yearly meeting 1764 'recommends to every member of our Society to discourage and suppress the same.' A similar recommendation was issued by the Society 1851 for the benefit of 'younger Friends' in particular, who appear to have been eating the forbidden fruit. The printed Epistle of the yearly meeting 1724 likewise 'advises against imitating the vain custom of wearing or giving mourning, and all extravagant expenses about the interment of the dead,' and this advice has been repeatedly renewed. A multitude of other minute peculiarities distinguish the Friends from their fellow-Christians.

3. *Discipline*.—By the term discipline the Friends understand 'all those arrangements and regulations which are instituted for the civil and religious benefit of a Christian church.' The necessity for such discipline soon began to make itself felt, and the result was the institution of certain meetings or assemblies. These are four in number: first, *Preparative* meetings; second, *Monthly* meetings; third, *Quarterly* meetings; fourth *Yearly* meetings. The first are usually composed of the members in any given place, in which there are generally two or more Friends of each sex, whose duty is to act as overseers of the meeting, taking cognizance of births, marriages, burials, removals, etc., the conduct of members, etc., and reporting thereon to the

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monthly meetings, to whom the executive department of the discipline is chiefly confided. The monthly meetings decide in cases of violation of discipline, and have the power of cutting off or declaring 'not in union,' all who by their improper conduct, false doctrines, or other gross errors, bring reproach on the Society, though the accused have the right of appeal to the quarterly meetings, and from these again to the yearly, whose decisions are final. The monthly meetings are empowered also to approve and acknowledge ministers, as well as to appoint 'serious, discreet, and judicious Friends, who are not ministers, tenderly to encourage and help young ministers, and advise others, as they, in the wisdom of God, see occasion': they execute a variety of other important duties. The quarterly meetings are composed of several monthly meetings, and exercise a sort of general supervision over the latter, from which they receive reports, and to which they give such advice and decisions as they think right. The yearly meeting consist of select or representative members of the quarterly meetings. Its function is to consider generally the entire condition of the Society in all aspects. It receives in writing answers to questions that it has previously addressed to the subordinate meetings, deliberates upon them, and legislates accordingly. To it exclusively the legislative power belongs. Though thus constituted somewhat according to Presb. order, yet any member of the Society may attend and take part in the proceedings.

Women have also a special sphere of discipline allotted to them: they inspect and relieve the wants of the poor of their own sex, take cognizance of proposals for marriage with advice to those concerned, deal with female delinquents privately, and under certain restrictions may even do so officially, though in the 'testimony of disownment,' they have always the assistance of members of the other sex.

The S. of F., in the multitude of its regulations has not forgotten the poor: charity in its narrower, as well as in its broader sense, has always been a beautiful feature of its members. No brighter names than some of those in this Society are found on the list of great benefactors of the race; and a constant and quiet charity flows from their hands. The care of the poor was one of the earliest evidences which Christianity afforded to the Gentiles of the superiority and divine character of its principles: and it is honorable to the Society that a similar provision for those united to them in religious fellowship appears to have been one of the earliest occasions of their meetings for discipline. Nevertheless, in accordance with their ruling principle, that all Christian duty should be left for its fulfilment to the spontaneity of Christian love, and not performed under compulsion of any kind, 'the provision for the poor is purely voluntary; yet their liberality is proverbial throughout Britain and America.

The former stringency of law against certain peculiarities has been almost entirely relaxed. Instead of taking the oath in court or at entrance on a civil office, they are allowed to make a solemn affirmation, though with the same penalty as for perjury in case of wilful falsehood. In Britain

FRIENDS OF GOD—FRIES.

compulsory church-rates have so largely been abolished as to give Friends practical liberation in that particular.

In 1903 the Friends in the U. S. were divided into four bodies, viz.: Orthodox, who had 794 organizations, 830 churches, 90 halls, 91,614 members, and church property valued at \$2,795,784; Hicksite, 201 organizations, 201 churches, 4 halls, 21,992 members, and church property \$1,661,850; Wilburite, 53 organizations, 53 churches, 1 hall, 4,468 members, and church property \$67,000; and the Primitive, 9 organizations, 9 churches, 4 halls, 232 members, and church property \$16,700—total organizations 1,056, churches 1,093, halls 99, members 118,306, and value of church property \$4,541,334.

FRIENDS OF GOD: brotherhood of mystics, having centres in Cologne, Strasburg, and Basle in the 14th c. They never organized themselves into a sect, were regular in their attendance at church services and in the observance of established church rules; but, protesting against the corruptions of the times, attempted to reform ecclesiastical practices, and set an example of holy living. Nicholas of Basle was their great leader and martyr, John Tauler their chief preacher, and the Dominicans principally their teachers.

FRIES, fr̄s, ELIAS MAGNUS: 1794, Aug. 15—1878, Feb. 8; b. in the dist. of Femsjö, Sweden: naturalist. He studied at Lund, where he taught botany 1828. In 1834, he was called to the Univ. of Upsala, as prof. of practical economics, with which, 1851, the chair of botany was conjoined. F.'s researches embrace the entire field of botany, *phanerogamous* as well as *cryptogamous* plants, and he was the first to introduce into Sweden the morphological theory, the basis of which is in his *Systema Orbis Vegetabilis* (Lund 1825). His earliest important work was *Observationes Mycologicæ* (2 vols. Copen. 1815-18). This was followed by *Systema Mycologicum* (3 vols. Greifsw. 1821-29; Supp. 1830), completed in *Elenchus Fungorum* (2 vols. Greifsw. 1828) and in *Novæ Symbolæ Mycologicæ* (Upsala 1851). For another department of cryptogamic botany, the lichens, F. did great service by his *Lichenographia Europæa Reformata* (Lund and Greifsw. 1831). Among his monographs *Symbolæ ad Historiam Hieraciorum* (Upsala 1848) deserves especial mention. He wrote a number of works on the *Flora* of Scandinavia, and his *Summa Vegetabilium Scandinaviæ* (Upsala 1846 *et seq.*) is one of his best productions. His *Herbarium Normale* (Upsala 1847), collected at great expense, and with incredible industry, contains dried specimens of all the rarest plants of Scandinavia. In 1851 he was appointed director of the Botanical Museum and Garden attached to the Univ. of Upsala, and in 1853 rector of the university; and, 1859, retired from work.

FRIES, JAKOB FRIEDRICH: 1773, Aug. 23—1843, Aug. 10; b. Barby, Prussian Saxony: founder of a philosophic school in Germany. He studied at Leipsic and Jena, and in 1805 went to Heidelberg, as prof. of philosophy and mathematics. In 1816 he accepted a call to the chair of speculative philosophy at Jena, but was deprived of his

FRIESLAND.

professorship, for his participation in certain democratic disturbances 1819. In 1824 he was appointed to the chair of physics and mathematics, which he occupied till his death. F.'s writings are very numerous. Some of the more important are *System der Philosophie als evidente Wissenschaft* (Leip. 1804); *Neue oder anthropologische Kritik der Vernunft* (3 vols. Heidelb. 1807; 2d ed., 1828-31); *System der Logik* (Heidelb. 1811; 3d ed., 1837); *Handbuch der physischen Anthropologie* (2 vols., Jena 1820-1; 2d ed., 1837-39); *Die Lehren der Liebe, des Glaubens, und der Hoffnung* (Heidelb. 1823); and *Geschichte der Philosophie* (2 vols. Halle 1837-40). In his philosophy, F. followed the method of Kant, but believing that method incomplete, he sought to supplement by an analytical nature-doctrine (*analytischen-naturlehre*) of the human soul, which he designated philosophic anthropology. His *Glaubenslehre*, or Doctrine of Faith, by which he hoped to repair the ravages which the critical philosophy had made upon the certainty of our knowledge, resembles, in some respects, Jacobi's doctrine of the Intuition of the Pure Reason. De Wette adopted it as the basis of his religious philosophy. Some of his disciples, Apelt, Schleiden, Schlömilch, Friedrich Francke, and Schmidt, published at Leipsic in 1848-9, several philosophic papers, entitled *Abhandlungen der Fries'schen Schule*.

FRIESLAND, *frēz'land*, or VRIESLAND, *frēs'lánt* (ancient *Frísia*): one of the most northern and one of the most wealthy provinces of the Netherlands; between 52° 40'—53° 30' n. lat. and 5° 30'—6° 20' e. long.: bounded n. by the German Ocean, w. and s.w. by the Zuyder Zee. It is sometimes called WEST FRIESLAND to distinguish it from EAST FRIESLAND, now a part of the Prussian province of Hanover (see below). The three divisions of F. are Leeuwarden, Heerenveen, and Sneek. There is a large import and export trade especially with England. The exports to England include potatoes, oats, butter, and cheese. The land is flat, in some parts below the level of the sea, and is intersected by canals and streams. Lakes and marshes are numerous. The dikes, sluices, and canals are under the care of a special board, and are kept up at the local expense. The inland waters abound with fish. Rich pastures, well suited for horses, cattle, sheep, and pigs, cover a third part of the surface. Large quantities of peat are made. The land products are chiefly wheat, rye, barley, oats, buckwheat, beans, peas, potatoes, colza, flax, etc. F. is well supplied with schools and charitable institutions. A sixth part of the population is at school. The capital is Leeuwarden (q.v.). Schiermonnikoog and Ameland carry on extensive fishing for cod, haddock, sole, turbot, etc. Pop. of province of F. (1891) 336,442; (1901) 345,004.

EAST FRIESLAND, 53° 8'—53° 40' n. lat., and 6° 50'—8° e. long., has nearly 1,200 sq. m. It now forms the Hanoverian dist. of Aurich; chief towns, Emden and Aurich. It is bounded n. by the German Ocean, w. by the Netherlands, s. by Aremberg, and e. by Oldenburg. Like Netherlands, Friesland, East F. is low and flat, re-

FRIEZE—FRIGATE.

quiring the protection of dikes and sluices. Fishing and agriculture are the chief employment of the inhabitants, descendants of the ancient Frisians. This province has frequently changed owners since 1744, when the family of Zirksena, in whose possession it had been for 300 years, became extinct. It was first ceded to Prussia, next incorporated by Napoleon with Holland and France; 1814 it was restored to Prussia; 1815 it was ceded to Hanover, with which it again forms part of Prussia. Pop. (1890) 335,824.

FRIEZE, n. *frēz* [F. *friser*, to curl or crisp; *frisons*, frizzled or raised work: Sp. *fres*, gold or silver lace: mid. L. *frisārē*, to ornament with borders]: a kind of coarse woollen cloth with a nap on one side: [F. *frise*; Sp. *friso*; OF. *frize*, a frieze]: in *classical arch.*, the flat part under the cornice of a column, usually ornamented with figures or other carved work; the central portion of the entablature; called by Vitruvius, the *Zophorus* (life-bearing), as being usually ornamented with sculptured figures: also any enriched horizontal band: V. to form a nap; to frizzle; to curl. **FRIEZED**, a. *frēzd*, napped; shaggy. **FRIEZELIKE**, a. **FRIEZ'ING**, n. the process of forming a nap on woollen cloth. *Note.*—**FRIEZE**, a coarse, shaggy cloth, by a false etymology, arising from a similarity in sound, is supposed to have come from *Friesland*. By a similar etymological blunder, *frizzled hen* is called *Friesland hen*; a kind of duck with a musky odor, a *Muscovy* duck—see Wedgwood and Skeat. Littré and Brachet both derive *frieze* from *Friesland*.

FRIGA, or **FRIGGA**: see **FREYJA**.

FRIGATE, n. *frīg'āt* [F. *frégate*—from It. *fregata* or Sp. *fragata*, a light row-boat; prob. connected with Goth. *fargod*, a row-galley; also with Lat. *aphractus*, undecked galley]: war-ship, generally carrying 20–50 guns, it was formerly a long narrow vessel propelled by oars and sails, used in the Mediterranean when speed was requisite. The name then came to be applied to men of war, of a class smaller than line-of-battle ships, and carrying from 20 to 50 guns, which were employed in the great wars of the 18th, and early part of the 19th c., as scouts and cruisers. The frigate, usually swift, easily managed, and capable of beating well up to the wind, became the favorite ship in war-time, and bore off a large proportion of the prize-money. Frigates served to obtain information as to the movements of hostile fleets, and to guide the sailing of their own; but it was unusual for them to join in the line of battle their exploits ordinarily occurring in engagements with single ships of their own class. One of Nelson's frequent complaints was, that he had not a larger number of swift frigates to intercept the enemy's cruisers; it having then been notorious that the French built faster and finer craft than the British dockyards could turn out, though it must be added, that most of these rapid frigates had changed their flag before the war closed.

With steam, and the growth of fleets in later times, frigates were developed more than any other men-of-war,

FRIGATE BIRD.

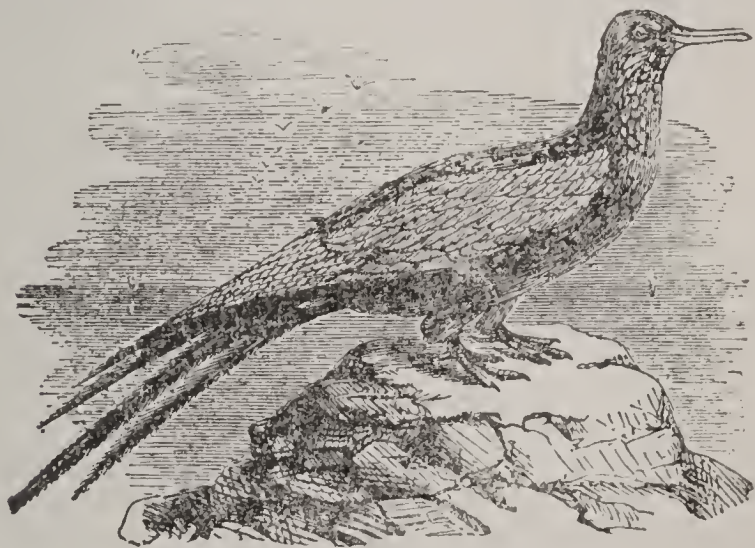
and many of the largest ships in the navy belonged to this class; such as the *Diadem*, *Mersey*, *Orlando*, and the iron plated *Warrior*, of 6,000 tons, three times the burden of



Frigate—First Class, 50 guns.

any ship of the line in Nelson's fleet. Now, however, these all are ships of the past, incapable of contending with the armored monsters which carry modern artillery.

FRIG'ATE BIRD, or MAN-OF-WAR BIRD, *Tachypetes aquilus*, or *Fregata aquilus*: bird of the Pelican family (*Pelecanidæ*), the only well-ascertained species of its genus, allied to the Cormorants. It is a large bird with black



Frigate Bird (*Fregata aquilus*).

plumage, sometimes measuring 10 ft.—some say even 14 ft.—from tip to tip of extended wings. It is a bird of very powerful and rapid flight, and there seems to be good reason for believing that it can remain on wing for days to-

FRIGATOON—FRINGE.

gether. It inhabits the intertropical coasts, of the Atlantic and Pacific Oceans, often flying far out to sea, but returning. Its aerial evolutions are extremely graceful, and it soars to a great height. It is said never to dive for its prey, but to seize fishes only when they appear at the surface or above it. Flying fishes constitute much of its food.

FRIGATOON, n. *frĭg-a-tón'* [It. *fregatone*]: Venetian vessel with a square stern, and only two masts.

FRIGHT, n. *frĭt* [Goth. *faurhts*, timid: AS. *forht*; Ger. *furcht*; Sw. *frukta*, fear: AS. *frihtan*, to terrify]: sudden terror of short duration; alarm. **FRIGHTFUL**, a. *frĭt'fúl*, exciting alarm or terror; shocking. **FRIGHTFULLY**, ad. *-lĭ*. **FRIGHTFULNESS**, n. state of being frightful; the power of impressing sudden fear. **FRIGHT**, v. *frĭt*, or **FRIGHTEN**, v. *frĭt'n*, to alarm suddenly; to terrify; to dismay. **FRIGHTENING**, imp. *frĭt'nĭng*. **FRIGHTENED**, pp. *frĭt'nd*.—**SYN.** of 'fright, n.': terror; consternation; fear;—of 'fright, v.': to scare; affright; daunt; intimidate;—of 'frightful': dreadful; alarming; fearful; terrible; terrific; horrid; horrible; awful.

FRIGID, a. *frĭj'ĭd* [L. *frigĭdus*, cold: It. *frigido*: F. *froid*]: cold; without warmth; without affection; formal; lifeless. **FRIGIDLY**, ad. *-lĭ*. **FRIGIDNESS**, n. **FRIGIDITY**, n. *frĭ-jĭd'ĭ-tĭ*, coldness; want of warmth; coldness of affection. **FRIGID ZONES**, the belts of the earth's surface which lie between the poles and the polar circles, $23\frac{1}{2}^{\circ}$ from each pole. **FRIGORIFIC**, a. *frĭg'ō-rĭf'ĭk* [L. *faciō*, I make]: that produces cold.

FRILL, n. *frĭl* [W. *ffrill*, to twitter, to chatter: F. *friller*, to shiver for cold: comp. Gael. *frith*, small; *fill*, plait]: a plaited band to a garment; a ruffle: V. to attach a frill to; to ruffle with cold, as a hawk her feathers. **FRIL'LING**, imp.: N. the ruffles or plaited bands of a garment. **FRILLED**, pp. *frĭld*. *Note.*—The connection is imitative of a twittering sound, a shivering vibratory motion, and then a curly or wrinkled surface—see Wedgwood.

FRIMAIRE, n. *frĕ-mār'* [F.]: term meaning frosty or sleety, but freely translated by an English wit freezy: adopted 1793, October, by the French Convention, for the third month of the republican year, November 21—December 20: see **CALENDAR**.

FRINGE, n. *frĭnj* [F. *frange*; OF. *fringe*—from mid. L. *fimbrĭā*; It. *frangia*; Ger. *franse*, a border of hanging threads: F. *froncer*, to plait, to wrinkle]: an edging of loose threads or ornamental open work; the edge; the margin. *Fringes*, in *optics*, those colored bands of diffraction (q.v.) which appear when a beam of light passes the clean edge of a screen, or is transmitted through a narrow slit or hole: V. to ornament with a loose border; to adorn with fringe. **FRING'ING**, imp. **FRINGED**, pp. *frĭnjd*: **ADJ.** bordered with a fringe. **FRINGE'LESS**, a. without a fringe. **FRINGE OF THE GARMENT**, called also the border or hem, prescribed by Moses, Num. xv. 38–41, to be worn by the Jews as a memento of the Divine law which had been given them: hence in later ages it gained a superstitious respect, and its

FRINGE TREE—FRISEUR.

enlargement was a Pharisaic custom, rebuked by Christ; and the woman in the throng around him secretly touched the fringe of his garment for healing, deeming it the most sacred and powerful part of his vesture. FRINGING REEFS, coral-reefs fringing or encircling islands at a small distance from shore.

FRINGE TREE (*Chionanthus*): genus of plants of the nat. ord. *Oleaceæ*, consisting of small trees or large shrubs, natives of America, the W. Indies, Ceylon, and New Holland. The Common Fringe tree or SNOWFLOWER (*C. Virginica*) is found in the United States from lat. 39° to the Gulf of Mexico. It sometimes attains the height of 20 or 30 ft., but is rarely more than 8 or 10, has opposite oval leaves 6 or 7 inches long, and very numerous snow-white flowers in paniced racemes. The limb of the corolla is divided into four long linear segments, whence the name fringe tree. The fruit is an oval drupe. The tree is frequently cultivated as an ornamental plant.

FRINGILLIDÆ, *frīn-jīl'li-dē*: family of birds of the ord. *Insectores*, tribe *Conirostres*, having a conical or nearly conical bill, sometimes short and thick, sometimes comparatively slender and elongated, sometimes convex above, below, or at the sides; the commissure—line of junction of the mandibles—straight. The neck is short, and neither the legs nor the wings are long. The Fringillidæ all are small birds; they feed chiefly on seeds—to some extent also on insects. The family is extremely numerous, and distributed over all parts of the world; including finches, linnets, sparrows, grosbeaks, crossbills, etc.; also weaver-birds, bobolinks, cardinal-birds, whydahs, tanagers, etc. Some naturalists extend its limits to include in it other groups, as buntings, larks, etc., often regarded as forming distinct families.

FRIPPERY, n. *frīp'ēr-ī* [F. *friperie*, old clothes, rags—from *friper*; OF. *fripper*, to wear to rags: Sw. *rifva*, to tear]: clothes thrown aside after wearing; place where old clothes are sold; useless or worthless trifles; tawdry finery: **ADJ.** in *OE.*, trifling; contemptible.

FRISCHE HAF, *frīsh'ēs haf* ('Fresh-water Bay'): large lagoon on the coast of Prussia, s.e. of the Gulf of Dantzic; somewhat less than 60 m. in length from n.e. to s.w., with a breadth varying from 4 to 12 m.; area 318 sq. m. It was formerly entirely walled off from the Baltic by the Frische Nehrung, a narrow spit of land extending about 40 m. along its northern shore. In 1510, however, the waters of the F. H. broke over the Frische Nehrung, and formed the passage called the 'Gatt,' which unites this shore-lake with the Baltic. The Gatt is only 10 to 15 ft. in depth. All large vessels load and unload at Pillau, at the mouth of the Gatt, on the shore of the Gulf of Dantzic. Cargoes are conveyed to and from the ports on the F. H. by means of lighters. The Pregel, Frisching, Passarges and two arms of the Vistula, fall into this lagoon.

FRISEUR, n. *frē-zēr'* [F. *friseur*—from *friser*, to curl]: a hairdresser.

FRISIANS.

FRISIANS, *friz'yanz* or *friz'i-anz* (Lat. *Frisii*): ancient Teutonic race in the n.w. of Germany. The origin of the name is lost in antiquity, though traditions, collected and written in *Thet oera Linda Bok*, in the 13th c. (see below) say that the F. came out of India, and that Frya, the mother of the race, was white as snow. The F. are mentioned by Tacitus and Pliny, and occupied the country between the middle arm of the Rhine (which fell into the sea at Katwyk) and the Ems or the Weser. With the Batavi, the Bructeri, and the Chauci, the F. became subject to Rome under Drusus, and for a time remained faithful; but, in A.D. 28, these German tribes were driven to hostilities by the oppression of the Romans, and though partially subdued, they again rebelled, 70, under Claudius Civilis, a Batavian, who made a bold but unsuccessful attempt to overthrow the Roman power in German Gaul. When at a later period the Batavi were absorbed by the Franks, and with them moved southward, the F. took possession of the abandoned districts, and occupied the country from the islands of the Scheldt to the Ems or Weser, so that the Netherlands, except some French and Saxon colonies, were peculiarly Frisian. These formed two branches, the one dwelling w. of the Zuyder Zee and the other e. of it. The Frisii of the s.w. were brought under the Franks by Pepin d'Heristal, who defeated them (689), and compelled them to embrace Christianity. The e. branch (785) was subdued by Charlemagne, who sent Christian teachers to preach the gospel to them, and who (802) defined their rights by the *Lex Frisionum*.

Later, the districts now called Friesland (q.v.) were reduced to their present limited boundaries by the formation of the hereditary countships of Holland, Zealand, Gueldres cum Zutphen, and the bishopric of Utrecht cum Yssel. Friesland was independent, and ruled by potentates chosen by the nation and endowed with limited powers, 802 to 1498. The counts of Holland coveted the sovereignty of Friesland, and internal discord at length gave the emperor of Germany a pretext for placing Duke Albert of Saxony (1498) as hereditary potentate. His son resigned the right, for a sum of money, to Charles V., who became Lord of Friesland as of the rest of the Netherlands. After the revolution in the 16th c., the F. had a stadtholder of the house of Nassau-Dietz. Several of these fell in the contest for freedom. Count John William Friso became Prince of Orange on the death of William III. His son, William Karel Hendrik Friso, became Stadtholder of the seven united districts. The F. are brave, attached to their manners and customs, upright, open-hearted, and intelligent. The Frisian language belongs to the Low German branch of the Teutonic, and is closely allied to the old Anglo-Saxon; it is, indeed, of all forms of speech now existing, the nearest to the Anglo-Saxon basis of the English language. The favorite poet of the peasantry is Gysbert Japicx. There is a set of laws for the F., composed about 1,200, and a complete collection of the laws extant was published by Richthofen (*Fries Rechtsquellen*, Gött. 1840). **A**

FRISK—FRITH.

Frisian Soc. of History, Antiquity, and Language, at Leeuwarden, has done much for a revival of Frisian literature. Among historical writers are Simon Abbes Gabbema, 1628-51; Petrus Wierdsma, 1729-1811; Foeke Sjoerds, 1713-70, etc. Since the 15th c. the Frisian language has gradually given place to the Dutch: it is still spoken in the rural parts of the present province of W. Friesland and, with modifications, in some other districts. It is used only by the peasantry, and not in schools or churches. Dutch is generally spoken in the towns. Efforts have been made to revive the Frisian by publishing the best specimens of the literature, annuals, etc. Among these are the poetical works of Gysbert Japicx, with a Friesch-Dutch Dictionary of the words; and *Thet oera Linda Bok*, edited and translated by Dr Otema, now reckoned by scholars an audacious and brilliant forgery. The best Frisian dictionaries are the *Friesch-Latin-Nederlandsch Woordenboek* (1874), and Richthofen's *Altfriesisches Wörterbuch* (1840).

FRISK, v. *frisk* [OF. *frisque*, lively, brisk: Icel. *friskr*, in full vigor, brisk: Sw. *frisk*, fresh: It. *frizzare*, to quaver, to spirt: comp. Gael. *frìosg*, lively]: to leap and skip about; to gambol in frolic and gayety: N. a frolic; a caper. FRISKING, imp. FRISKED, pp. *friskt*. FRISKER, n. one who. FRISKY, a. *friskì*, lively; frolicsome. FRISKILY, ad. *-lì*. FRISKINESS, n. dancing or leaping in frolic; liveliness.

FRISKET, n. *friskèt*, or FRISQUET, n. *-kèt* [F. *frisquette*, frisket, so called from the frequency and briskness of its motion: connected with FRISK]: in *printing*, the light frame which holds the sheet of paper on the tympan.

FRIT, or FRITT, n. *frit* [F. *fritte*—from It. *fritta*, frit—from L. *frictus*, dried, parched]: the mixture of which glass is made after being calcined or baked in the furnace, but before the materials are melted.

FRIT, *frit* (*Oscinis Frit*, or *Chlorops Frit*): insect of the same family with the house-fly; an active greenish-black fly of the size of a large flea, which does great injury to barley crops in some n. parts of Europe. It lay sits eggs in the flowers, and its larvæ live on the young grains. Linnaeus affirms that a tenth part of the barley in Sweden and Lapland is annually destroyed by it. It is nearly allied to the insects called corn-fly and wheat-fly.

FRITH, *frith*, or FIRTH, *ferth* [Lat. *fretum*, Gr. *porthmos*; from the same root as Ferry, q.v.]: arm or channel of the sea that is passed or crossed; the widening of a river as it opens into the sea: see FIRTH.

FRITH, *frith* (or FRYTH), JOHN: abt. 1503-1533, July 4; b. Sevenoaks, Kent: English reformer and martyr. He was educated at Eton and King's College, Cambridge, removed to Card. Wolsey's newly-founded college (now Christ Church) at Oxford 1525, was imprisoned by the Romanists as a heretic because of his sympathy with the reformation in Germany, was released through Wolsey's influence and fled to the continent 1528, resided some time

FRITH—FRITHJOF'S SAGA.

In the Univ. of Warburg, was associated with Tyndal in literary work, and became intimate with the leading scholars and reformers. While at Warburg he published a translation of Hamilton's *Places*, shortly after Hamilton's martyrdom; the *Revelation of Antichrist*, translated from the German; *An Antithesis wherein are compared togeder Chrstes Actes and our Holye Father the Popes* (1529); and *Disputacyon of Purgatorye*, a treatise against Sir Thomas More, Bp. Fisher of Rochester, and Rastell (1531). He returned to England 1532, and for several months evaded arrest on a warrant issued on behalf of Sir Thomas More, then lord chancellor, but was captured when about escaping to Flanders, and imprisoned in the tower at London. At first he was treated with severity, but on the accession of Sir T. Audley to the chancellorship more lenient measures were sanctioned, particularly by Thomas Cromwell and Cranmer. But he persisted in maintaining his views on purgatory, and while in confinement wrote a treatise on the Lord's Supper in which he denied transubstantiation. King Henry, taunted in a lenten sermon with holding him in the tower 'rather for safeguard than for punishment,' ordered that he be formally examined. He was tried, adjudged guilty of denying that the doctrines of purgatory and transubstantiation were necessary articles of faith, and condemned to the stake by Dr. Stokesly, Bp. of London. His publications also include *A Mirror or Glass to Know Thyself*, and *A Mirror or Looking-glass wherein you may behold the Sacrament of Baptism*. Cranmer, one of his judges, was condemned and burned 23 years afterward for advocating precisely similar views regarding the Lord's Supper.

FRITH, *frith*, WILLIAM POWELL, R.A.: English artist: b. Ripon, Yorkshire; son of an innkeeper. In 1840, he exhibited, at the Royal Acad., London, a scene from Shakspeare's *Twelfth Night*, *Malvolio before the Countess Olivia*, which attracted attention. In 1841 he exhibited the *Parting Interview of Leicester and his Countess Amy*, from Scott's *Kenilworth*; and thenceforth rose rapidly in public estimation. Among his paintings are the following: *My Wife would bid both stand up to see which was the Tallest*, from the *Vicar of Wakefield*, 1842; *English Merrymaking a Hundred Years ago*, 1847; *An Old Woman Accused of Witchcraft in the Time of James I.*, 1848; and *Coming of Age*, 1849; etc. F. was elected an associate of the Acad. 1845, and a royal academecian 1853. In 1854, his *Life at the Seaside* was one of the leading features of the Exhibition. *The Derby Day* (1858), and *Claude Duval* (1860) are two of his most successful pictures. For the *Railway Station* (1862), he is said to have received 8,700 guineas. In 1865 he painted the *Marriage of the Prince of Wales*. The series called the *Road to Ruin* was produced 1878. F. was elected an honorary member of the Imperial Acad. of Fine Arts at Vienna, 1869; of the Royal Acad. of Belgium 1871; and Sweden 1873. Published *Reminiscences* 1888.

FRITHJOF'S (or FRITHJOF'S) SAGA, *frith'jofs sá'ga*: ancient Icelandic myth, probably first written at the end of the 13th or beginning of the 14th c.; recording the life

FRITILLARY.

and adventures of the hero Frithjof (properly *Fridhthjof*, i.e., 'peace-destroyer'), who loved the beautiful Ingeborg, daughter of a petty king of Norway. After being rejected by the brothers of Ingeborg, and having committed various acts of revenge on his enemies, he comes to the court of the old king Hring, to whom Ingeborg has been married, and is received with kindness. At the death of her husband, Ingeborg is married to her lover, who acquires with her hand the dominions of Hring, over which he rules prosperously to the end of his days. Frithjof is supposed to have lived in the 8th c.; but some writers assign to him a much earlier period. This Saga was included by Björner in his collection *Nordiska Kämpadater* (Stoch. 1737); and by Rafu in his *Fornaldar Sögur Nordhrlanda* (Copen. 1829). Attention has of late years been drawn especially to this ancient Saga, which is merely one of a number of similar mythical narratives, in consequence of the distinguished Swedish poet, Bp. Tegner, having selected it for the groundwork of a poem (*Frithjof's Saga*), which was published complete 1825, and at once became the most popular poem that had ever appeared in Sweden, bringing its author to high repute. Tegner follows the Saga so closely, that the merits or demerits of the plan of the story must be ascribed more to the original than to himself; but foreigners scarcely discern in the poem the excellences attributed to it by Swedish critics. The diversity of metre employed in the 24 cantos, of which each differs wholly from the others, detracts from the completeness of the whole, and produces an inharmonious effect. The *Frithjof's Saga* of Tegner has been translated into several other languages; among the six or seven English translations, are those by R. G. Latham (1838) and G. Stephens (1841).



Crown Imperial (*Fritillaria imperialis*).

FRITILLARY, n. *frit'il-ér-î* [L. *fritillus*, a dice-box],

FRITILLARY—FRIVOLOUS AND VEXATIOUS.

(*Fritillaria*): genus of plants of the nat. ord. *Liliacæ*, herbaceous, bulbous-rooted, with bell-shaped perianth of six distinct segments, each having a conspicuous honey-pore (nectary) at the base. About 20 species are known, natives of Europe and other temperate regions of the n. hemisphere. All have drooping flowers; some are beautiful. The COMMON F. (*F. meleagris*), found in meadows and pastures in the e. and s. of England, flowers in April or May: the stem, about 12 inches high, bears several linear leaves, and in general only one flower, which is flesh-colored, marked with many dark spots. Many varieties are in cultivation.—The genus includes the CROWN IMPERIAL (*F. imperialis*), native of Persia and the n. of India, a well-known ornament of gardens.

FRITILLARY: name of a number of species of butterfly, from the resemblance of the coloring of their wings to that of the petals of the common fritillary. This resemblance appears only on the upper side of the wings, the under side being often remarkable for metallic brilliancy.

FRITTER, v. *frīt'tēr* [L. *fritinnīrē*, to twitter: F. *frētiller*, to fidget: Gr. *phrittō*, I tremble]: to cut or break into small pieces; to waste away by bits or degrees: N. a fragment or shred. FRIT'TERING, imp. FRIT'TERED, pp. -*tērd*.

FRITTER, n. *frīt'tēr* [F. *friture*, a frying—from mid. L. *frictūra*: It. *frittare*, to fry in a pan (see FRY 1)]: a small cake or piece of meat, or fruit, fried; a pancake; generally, preparations of butter.

FRITZSCHEITE, n. *frīt'shēh-īt*: a vitreous or pearly reddish-brown or hyacinth mineral; found in Bohemia and Saxony.

FRIULI, *frē-ō'lē* (Ger. *Friaul*; anc. *Forum Julii*): old name of a region in the extreme n.e. of Italy at the head of the Gulf of Venice; early divided into *Austrian* and *Venetian* F. The former comprises the Austrian districts of Görz and Gradiska and Idria; the latter, the Italian province of Udine. F. is rich in corn and wine; has much metallic wealth and numerous mineral springs. The inhabitants of Venetian F. are mostly *Furlani*, speaking a dialect akin to Italian, mixed with Celtic elements. Austrian F. is peopled mainly by Slavs, with many Italians. F. constituted one of the 36 duchies into which the Lombards divided the n. of Italy, and shared the vicissitudes of its neighbor states.

FRIVOLOUS, a. *frīv'ō-lūs* [F. *frivole*—from L. *frivōlūs*, trifling: It. *frivolo*]: slight; trifling; of little weight or importance. FRIV'OLOUSLY, ad. -*lī*. FRIV'OLOUSNESS, n. the quality of being of very little worth or importance. FRIVOLITY, n. *frī-vōl'ī-tī*, acts or habits of trifling.—SYN. of 'frivolous': petty; trivial; unimportant; worthless; silly.

FRIV'OLOUS AND VEXA'TIOUS: terms applied in law to insufficient grounds of objection as alleged in petitions or formulated in indictments, or brought in actions at law. They are prohibited by statute, and subject the party presenting them to cost and damages.

FRIZZ—FROBISHER.

FRIZZ, *v.* *frīz* [*F. frizer*, to curl: *Gr. phrix*, originally a rustling sound; *phrixos*, rough, curled]: to form into small curls; to form into little hard prominences or burs, as the nap of cloth. **FRIZ'ING**, *imp.* **FRIZZED**, *pp.* *frīzd*. **FRIZZLE**, *v.* *frīz'l*, to curl or crisp in small short curls. **FRIZZLING**, *imp.* *frīz'ling*. **FRIZZLED**, *pp.* *frīz'ld*.

FRO, *ad.* *frō* [*AS. or Dan. fra:* contr. of *FROM*, which see]: from; back or backward. **TO AND FRO**, there and back; backward and forward.

FROBENIUS, *frō-bē'nī-us* (or **FROBEN**), **JOANNES**. 1460-1527: learned printer of Basel. He was educated at the Univ. of Basel. He was intimate with Erasmus, and employed him and Ecolampadius to superintend the printing of various important works. He was the first German printer who did nearly perfect work; and between 1491 and 1527, the year of his death, he issued 300 works (including all those of Erasmus).

FROBISHER, *frōb'ish-ēr* or *frō'bīsh-ēr*, **SIR MARTIN**: abt. 1535-1594, Nov. 7; b. Doncaster: naval adventurer of the Elizabethan period, the first Englishman who sought to discover a n.w. passage to China. For many years, he in vain labored to impress English merchants with an idea of the importance of a n.w. passage; but at length, being patronized by some persons of rank and fortune, he succeeded in raising money enough to fit out two small vessels of 25 tons each, and a pinnace of 10 tons. With these he sailed from Deptford 1576, June 8, the queen, then at Greenwich, bidding them God speed on their venturous way by 'shaking her hand at them out of the window.' Steering north, they (July 11, in lat. 61° n.) sighted the s. part of Greenland, which F. took to be the Friesland of Zeno, on the 11th July, to the east point of which F. gave the name of 'Queen Elizabeth's Foreland;' and on the 28th, they sighted *Meta Incognita*. On Aug. 11, F. entered the inlet which bears his name, then thought to be one of the entrances from Davis' Strait into Hudson's Bay. After about a fortnight's exploration of the coasts and islands, F.—having lost, through the treachery of the natives, a boat and five men—returned to England. He brought with him some ore picked up on one of the islands that he discovered, in which some gold was found. Visions of immense wealth to be derived from further search in these northern lands floated before the eyes of the speculators of the time, who immediately fitted out another and better appointed expedition, giving the command to Frobisher. He sailed 1577, May, but his discoveries, hampered as he was by the gold-seeking operations, which turned out comparatively worthless, did not extend further than the neighborhood of the strait that he had before reached. A third expedition was sent out in the year following; but geographical science appears to have been but little benefited by it. F. afterward served under Drake in the W. Indies; and for his distinguished bravery in the fight with the Spanish Armada, 1588, July 26, he received knighthood. He afterward commanded a squadron sent out to ravage the Span

FROBISHER BAY—FROEBEL.

ish coast. He died from the effects of a wound received while leading an attack by sea against Brest.

FROBISHER BAY: arctic inlet opening westward near the mouth of Davis' Strait into the territory called by Frobisher *Meta Incognita*, at the s. end of Baffin Land. It is about 200 m. long and more than 20 wide, with rugged mountainous shores. It was till Hall's voyage called Frobisher *Strait*, being erroneously regarded as a passage into Hudson's Bay.

FROCK, n. *frök* [F. *froc*, a monk's habit—from mid. L. *frocus*, a shaggy cloak, a monk's frock: Port. *frocco*, a tuft of wool: comp. Gael. *frag*, a covering]: a loose upper dress worn by children and females; a loose upper garment worn by men. **FROCKED**, a. *frökt*, dressed in a frock. **FROCK'-LESS**, a. without a frock. **FROCK-COAT**, a coat with skirts meeting in front. **MONK'S FROCK**, a monk's outer garment. **SMOCK FROCK**, a loose outer garment worn principally by agricultural laborers in England; a blouse. **TO UNFROCK A CLERGYMAN**, to suspend him for bad conduct.

FRODOART: see **FLODOARD**.

FROEBEL (or **FRÖBEL**), *frö'bél*, **FRIEDRICH WILHELM AUGUST:** 1782, Apr. 21—1852, June 21; b. Oberweissbach: founder of the Kindergarten system of education. He followed various occupations ere he discovered where his real strength lay; but in 1805 he taught in a model school at Frankfurt-on-the-Main with much success, and afterward he entered Pestalozzi's institution at Yverdon. In the campaign of 1813, he served as a volunteer. In 1817 he established a school at Keilhau, in Thuringia, to carry out his principle of promoting the full and harmonious development of child nature. After 14 years of labor, he went to Switzerland, where he founded several schools. On his return to Germany, he devoted himself to the education of very young children; and in 1837 he opened at Blankenburg, his celebrated *Kindergarten*, or 'Garden of Children,' which languished for want of funds, and ultimately was given up. As F.'s views and his system were confounded with those of his socialist nephew, Karl F., the Prussian govt. actually prohibited the founding of schools on F.'s principles; and it was not till after his death that the Kindergarten system—his great claim to grateful remembrance—found acceptance in Germany. In the later years of his life, F. employed himself in training female teachers. He died at Marienthal. F. wrote *Die Menschengenerziehung; Pädagogik des Kindergartens*; and *Mutter- und Koselieder*. See **KINDERGARTEN**.

FROEBEL, *frö'bel* (or **FRÖBEL**), **JULIUS:** nephew of Friedrich F.: author: b. Greisheim, Germany, 1805. He studied at Rudolstadt, Keilhau, Stuttgart, Munich, Weimar, and Berlin, removed to Zurich 1833 and was several years prof. of geography and the natural sciences, published several works, became a naturalized citizen, and started the *Swiss Republican*, a radical opposition newspaper, 1839. After the revolution in Prussia 1848 he was chosen a member of the national assembly, and in Oct. went to Vienna,

FROELIGH.

where he was arrested and condemned to death by a court martial. He was pardoned, returned to Switzerland after the defeat of his party, and came to the United States 1850. For six years he traveled extensively as correspondent of the *New York Tribune*, returning to Germany as a naturalized citizen of the United States 1857. In 1862 he settled in Vienna and became active in liberal politics, and 1867 started the *South German Press* in Munich, which he edited till 1873, where he was appointed German consul to Smyrna. In 1876 he was transferred to Algiers. His leading works are *System of Crystallography* (Zurich, 1843). *System of Social Politics* (London, 1847): *The Republican*, historical drama (Leipsic, 1848): *Seven Years' Travel in Central America, Northern Mexico, and the Far West of the United States*, 2 vols. (1857-8): *Theory of Politics* (1861) *Political Addresses* (1870). He d. 1893, Nov. 7.

FROELIGH, *frö'lich*, SOLOMON: 1750, May 29—1827, Oct. 8; b. Red Hook, N. Y.: Dutch Ref. minister. He was the son of a farmer, brought up in the Dutch Ref. Church, educated for the ministry by Johannes H. Goetschius, licensed to preach 1774, and after serving in the revolutionary army, removed to Hackensack, N. J., 1786. The Dutch Ref. Church for some time had been divided into an independent and a conservative branch, and during the war the breach had been widened by political considerations. F. attempted to unite the congregations and was meeting with some success when lightning broke the stone over the entrance of his church bearing the words 'Union makes Strength,' and the congregations alarmed at what they believed to be an ill-omen became more opposed than ever to his overtures. He pleaded for union and engaged in the ecclesiastical controversies of the day till 1822, when with the adherents of the independent branch he organized the 'True Reformed Dutch Church.' For this act he was suspended by his synod. His numerous publications include *The Trial of Universal Charity by a Jury* (New York 1824); and *Reasons Assigned by a Number of Ministers, Elders and Deacons for declaring themselves the True Reformed Dutch Church in the United States* (Hackensack 1822).

FROG.

FROG, n. *frög* [AS. *frogga*; Icel. *froskr*; Ger. *frosche*; Dut. *vorsch*, a frog: comp. Gael. *frog*, a marsh, a fen]: an amphibious four-footed reptile. FROG-FISH, a sea-fish, also called the angler (see below). FROG-BIT, a marsh plant, the *Hydröch'ärís mörsus-ranæ*, ord. *Hydrocharidäcææ* (see HYDROCHARIDÆÆ). FROG-FLY and FROG-HOPPER (see FROTH-FLY). FROG-SPAWN, properly the gelatinous mass in which the ova of frogs are inclosed; but colloquially applied to the green slimy masses of certain fresh-water algæ on the surface of streams. FROG-SPIT, same as cuckoo-spit (q.v.): see also FROTH-FLY.

FROG, n. *frög* [F. *fourchette*, a little fork—from *fourche*, a fork—from L. *furca*]: a ligamentous or horny structure in the middle of the sole of a horse's foot; probably corrupted as if from *fork*; it is also called a *frush*.

FROG, n. *frög* [Port. *frocco*, a tuft of wool or silk]: a kind of button or tassel on a coat. FROGGED, a. *frögð*, ornamented with frogs; a term applied often to uniforms with stripes or workings of braid or lace, mostly on the breast of a coat.

FROG (*Rana*): genus of *Batrachia*, having in the adult state four legs and no tail, no gills, four toes on each of the fore-feet, five on each of the hind-feet, the feet more or less webbed; the head flat, the muzzle rounded; the mouth very large, a row of small teeth in the upper jaw, and an interrupted transverse row on the middle of the palate. The young (tadpoles) breathe by means of gills; external gills forming little fringes at the sides of the neck when they are very young, which, however, in a few days disappear; the gills, which remain until the tadpoles undergo their final metamorphosis into frogs, being very numerous minute crests attached to four cartilaginous arches on each side of the neck, in a cavity to which the water enters from the mouth, and from which it is expelled by one or two small orifices. Tadpoles have no legs, and the body tapers into a tail, and thus has a fish-like form, very different from that of the mature F., the tail being furnished with a membranous border like a fin. The mouth of the tadpole is a horny beak, which falls off when it becomes a frog. When this metamorphosis takes place, the hind-legs grow first, and afterward the fore-legs begin to appear, the tail being gradually absorbed. Tadpoles are capable of living in water only; but the mature F. visits the water only occasionally, though generally capable of remaining long immersed, and always preferring moist places. In respiration, frogs draw in air through the nostrils, by movements of the muscles of the throat, and expel it by contraction of those of the lower part of the abdomen. The thin smooth skin of frogs is also believed to be subservient to the aëration of the blood. The skeleton is destitute of ribs. The eye is large and beautiful. The colors are often pleasing, and the general aspect agreeable, in some species very much so, forming a strong contrast to the repulsive appearance presented by toads, notwithstanding the close affinity between them in structure and habits. The greater pro-

FROG.

portionate length and strength of the hind-legs enables frogs to leap to a distance wonderful for creatures of their size, instead of crawling as toads do, and their activity and liveliness complete the contrast. The males have on each side of the neck a delicate membrane, which becomes inflated with air when they croak. The power of voice in the females is much inferior. The croaking of numerous frogs in marshy places, or around ponds and ditches, often makes an amusing and curious concert; and the powers of voice possessed by the great Bull frogs (q.v.) of N. America are amazing. The neighborhood of Rio Janeiro is enlivened as night comes on by the Blacksmith F., which croaks so sonorously that the noise is like the clanging of a hammer on an anvil, the intermingled voices of some other kinds resembling the lowing of cattle at a distance; and in Peru, there is a F., of large dimensions, which has acquired the name of *Trapichero*, or Sugar-miller, because



Frog:

Successive stages—in the order of the numbers—from the egg almost to the perfect form.

its voice has a grating sound like that produced by a sugar-mill. The confused blending of the voices of different species of frogs, in these countries, destroying the stillness of night, is one of the things most certain to arrest the attention of the stranger. In colder climates, frogs usually bury themselves in mud and spend the winter in torpidity. In dry weather, they conceal themselves under shrubs and in tufts of herbage, from which rain quickly causes them to come forth, multitudes often appearing where not one was to be seen before. They feed chiefly on insects, slugs, etc. The beaks of tadpoles are adapted to the eating of leaves and other vegetable food, on which Cuvier says they entirely subsist; but the younger Buckland, in his *Curiosities of Natural History* (4th ed., Lond. 1859, pp. 2-4), in an amusing account of the habits of tadpoles, more cor-

rectly describes them as showing a great avidity for animal food, crowding round a dead kitten, and nibbling at the toes of little boys who wade in pools where they abound. The spawn of frogs is a gelatinous mass, in which the eggs are contained, and which swells greatly by imbibing moisture. Impregnation takes place after it is deposited, as with the spawn of fishes.

The RED F. (*R. temporaria*), known by that name in France, and abundant in most parts of England and Scotland, is said to be not truly indigenous to Ireland, and to have been introduced into that island 1696. Its generally reddish color, varied with black spots and patches, readily distinguishes it from the GREEN F. or EDIBLE F. (*R. esculenta*) of the s. of Europe—sometimes said also to have been found in Britain—which is olive green, with yellow stripes along the back, and generally larger than the red species. The s. of Europe produces a number of other species, and they are generally more numerous in warmer climates. A remarkable peculiarity is exhibited by some frogs of tropical countries in a hornlike prominence above each eye. These have been separated into a new genus (*Ceratophrys*). The TREE FROGS (q.v.), (*Hyla*), the most beautiful and interesting of all, have the extremities of the toes enlarged into a sort of cushion, secreting a viscid humor. Several other genera have been separated from the Linnæan genus *Rana*, but there is a strong family likeness among them all.

The use of frogs for food is in some countries regarded with disgust, but is very common in some southern countries of Europe, where, indeed, this food is regarded as particularly delicate. The species chiefly used as food in Europe is the GREEN F. (*Rana esculenta*), above mentioned, which greatly abounds in ponds and slow streams in France, s. Germany, and Italy. It feeds chiefly on insects, after which it darts with great agility on the banks, and may often be seen swimming with its head above water, or basking in the sunshine. Frogs are there taken for the markets by nets, and by a kind of rake. In Vienna, they are kept and fattened in preserves adopted to the purpose. In France, the hind-quarters alone are prepared for the table; in Germany, all the muscular parts. They are dressed in various ways, and with various sauces, of which a great part often consists of wine.—The GRUNTING F. (*R. grunniens*) of the W. Indies, a very large species, six or eight inches long, capable of leaping over a five-ft. wall, is much used for food, its flesh being very white and delicate, and is often fattened for the table. It shows considerable capacity for domestication, and readily becomes familiar.—A species of F. (*Pyxicephalus adspersus* of Dr. Smith) is much used as food by the native tribes of s. Africa. Dr. Livingstone says the Bechuanas suppose it to fall from thunder-clouds, because after a thunder-shower the pools become alive with frogs, till then hidden in holes. This species is nearly six inches long, and when cooked resembles chicken. See AMPHIBIA: BATRACHIA; also *The Common Frog*, St. Geo. Mivart, 1878.

FROG-FISH—FROISSART.

FROG'-FISH (*Batrachus*): genus of acanthopterygian fishes of the family *Lophiidae*, to which also the Angler (q.v.) or Fishing Frog belongs. They are remarkable for excessive ugliness. The head is larger than the body; flattened, and spiny; the mouth is very large, with many teeth; the lips are often furnished with filaments; the pectoral fins are supported by a short stalk or wrist. The skin is naked in some species, scaly in others. The species are numerous and widely distributed. They hide themselves in the sand to surprise their prey.

FROHS'DORF: see **FROSCHDORF**.

FROISSART, *froys'sârt*, F. *frwâ-sâr'*, **JEAN**: 1337-1410; b. Valenciennes: French poet and historian. Being destined for the priesthood, he received a liberal education, but soon evinced a passion for poetry and the charms of knightly society. At the age of 20, he began to write a history of the wars of his time, and made several journeys to examine the scene of their events. The composition of this work, which forms the first part of his *Chronicles*, occupied him 1357-60. On its completion, he went over to England, where he was received with great favor by Philippa of Hainault, wife of Edward III. In 1362, she appointed him clerk of her chapel and secretary. Two years afterward, he visited Scotland, where he became the guest of King David Bruce, and also of William Earl of Douglas. Everywhere the gay, poetical, quick-witted, and shrewdly observant Frenchman was welcomed and honored. In 1366, he accompanied the Black Prince to Aquitaine and Bordeaux. He afterward went with the Duke of Clarence to Italy. F. with Chaucer and Petrarch, was present of the marriage of this prince, at Milan, with the daughter of Galeazzo Visconti, and directed the festivities given by Amadeus VI., of Savoy, in honor of the duke. On the death of his protectress Philippa, F. gave up all connection with England, and, after many adventures, entered the service of Wenceslaus, Duke of Brabant, as private secretary. The duke was himself a poet, and F. made a collection of his verses, to which he added some of his own, and entitled the whole *Meliador, or the Knight of the Golden Sun*. On the death of Wenceslaus, he entered the service of Guy, Count of Blois, who encouraged him to continue his *Chronicles*. He journeyed to the court of Gaston Phœbus, Count de Foix, that he might hear from the lips of the knights of Bearn and Cascony an account of their exploits. F. made several similar journeys. In 1394 he obtained the canonry and treasurership of the collegiate church of Chimay; in the following year visited England, where he was courteously and generously entertained by King Richard II.; and on his return spent the remainder of his life in completing his great work. He died at Chimay. F.'s *Chronicles* embrace the events occurring 1326-1400, and are valuable documents for illustrating the character and manners of his age. The pageantry of feudal times brightens his pages; the din of arms, the shouting of knights, and the marshalling of

troops, is ever and anon heard; while 'visions of fair women' rise before us as we read. The gorgeous feasts and spectacles in which F. so much delighted are set forth in copious details; and though F. is no philosopher, his shrewd observations and richly minute descriptions have helped others to philosophize. F.'s *Chronicles* first appeared at Paris about the end of the 15th c., under the title of *Chroniques de France, d'Angleterre, d'Ecosse, d'Espagne, de Bretagne, de Gascogne, Flandres et lieux d'alentour*. The best edition is that of Buchon (15 vols., Paris 1824-26). His poems have been published by Buchon (Par. 1829). The beautiful ms. of the *Chronicles* in the library at Breslau was executed 1468, and was secured to the town in a separate article, when Breslau capitulated to the French 1806. The *Chronicles* have been translated into Latin and several modern languages. England has two versions: one executed 1523-25 by Bouchier Lord Berners (reprinted 1812); and the other in 1803-5 by Thomas Johnes (reprinted by Bohn 1845). The latter is the more exact; but the former, according to Sir Walter Scott, is the more artless and lively.

FROLIC, n., sometimes FROLICK, n. *fröl'ik* [Ger. *fröhlich*, in good humor—from *fröh*, gay; *lich*, like: Dut. *vrolijk*, merry, gay]: a wild prank; gayety and mirth; a gambol: ADJ. gay; full of pranks: V. to play wild pranks; to gambol. FROL'ICKING, imp.: ADJ. playing pranks; gambolling. FROL'ICKED, pp. *-ikt*. FROL'ICSOME, a. *-ik-süm*, given to pranks and fun; full of mirth. FROL'IC-SOMELY, ad. *-li*. FROL'ICSOMENESS, n. wild pranks.

FROM, prep. *fröm* [AS. *fram*; Icel. *framm*; Dan. *frem*, forth, forward]: away; out of; denoting distance in space or time; generally denoting separation, removal, or departure: in the following phrases—from above; from afar; from beneath; from behind; from hence, thence, or whence,—the construction may frequently be considered as a *preposition and its case*: the following phrases—from amidst; from among; from beneath; from beyond; from forth; from off; from out; from out of; from under; from within,—are simply prepositional phrases, and as such followed by an objective case.

FROME, or FROME SELWOOD, *fröm sël'wúd*: parliamentary and municipal borough, in the e. of Somersetshire, England, on the Frome, a branch of the Avon, 12 m. s.s.e. of Bath. The surrounding country is picturesque; and the town, until modernized early in the present century by the formation of two wide thoroughfares, was a strange old place with narrow, crooked, and steep street and lanes, many of which remain. It manufactures woolens, hats, silk, and cards for dressing woolen cloth. F. has long been famed for its ale. Pop. (1891) 9,613. The once celebrated forest of Selwood was in the vicinity, and part of it remains in its original state.

FROND, n. *frönd* [L. *frons*, or *frondem*, a leaf: It. *fronde*]: in *botany*, leaf of a cryptogamous plant; originally distinctive of organs in which the functions of stem and

leaf are combined, and was applied to the leaves of palms, etc.: the term *leaf* is now generally used even as to mosses, ferns, etc., and the term *thallus* as to lichens. In the case of many *Algæ*, the term F. is often used to designate the whole plant except its organs of reproduction. FRONDA'-TION, n. -dā'shūn, the act of stripping trees of leaves or branches. FRONDESCENCE, n. frōn-dēs'ēns, the time or season of putting forth leaves. FROND'LET, n. a little frond. FRONDOSE, a. frōn'dōs, in bot., having a foliaceous or leaf-like expansion.

FRONDE, frōnd, F. frōngd: name of a political faction in France during the minority of Louis XIV., which was hostile to the court and the prime minister, Mazarin, and caused great domestic troubles 1648 to 54. The grasping and despotic policy of Mazarin, to whom Anne of Austria, queen-regent, had abandoned the reins of government, had given offense to all classes. The princes and nobles saw themselves excluded from all high offices in the state, and their place supplied by foreigners; the parliament of Paris was threatened in its political rights, and the people groaned under the burden of taxes and administrative abuses. The parliament commenced a course of determined opposition, refusing to register the royal edicts, especially the disgraceful financial measures. Although the young king, then only nine years old, was obliged by several 'Beds of Justice' (q.v.) to compel the registration of the edicts, and to forbid the opposition of the parliament, the latter did not on that account change its bearing toward the court. Mazarin, therefore, adopted violent measures. 1648, Aug. 26, he ordered the president, Potier de Blanchemenil, and the councillor, Peter Broussel, to be arrested. The people took up arms, dispersed the Swiss guard, and on Aug. 27 (*la journée des barricades*), erected barricades in the streets around the Palais Royal. The court now yielded, repealed several taxes, and promised a better administration of justice. This victory gave parliament courage; those members who continued to keep a sharp look-out on the court measures, and were styled by the adherents of Mazarin *frondeurs*—i.e., censurers (literally 'slingers')—formed the majority. The court now resolved to suppress the movement, in which the populace of the capital had also taken part, by force of arms, and, 1649, Jan. 6, removed secretly to St. Germain, leaving Paris to be blockaded by the Prince of Condé with 7,000 men. The parliament, whose cause was now publicly espoused by the Prince of Conti, the Dukes of Longueville, Beaufort, Orleans, Bouillon, Elbeuf, Vendôme, Nemours, the Cardinal De Retz, and the Maréchal de la Mothe, called upon the people to resist and even negotiated with the stadtholder of the Netherlands for an auxiliary corps. In this critical position, the court, Mar. 11, concluded a compact at Ruel, in which both parties missed their object. After the return of the court to Paris in Aug., a new turn was given to the contest, the princes of the blood disputing the power with Mazarin. This, 1650, Jan. 18, led to the sudden arrest of Condé, Longueville, and Conti. This arbitrary proceeding roused the provinces. Marshal Turenne

assumed the title of lieut.gen. of the royal army for the liberation of the princes, united himself with the Archduke Leopold, and took several fortified towns, but was finally completely defeated by Mazarin's troops at Rhetel, Dec. 15. Mazarin returned in triumph to Paris, but found all parties against him, and his removal was insisted upon so urgently, that he was obliged to release the princes, and flee to the Netherlands. A disgraceful system of intrigue was now substituted for force of arms, which totally changed the position of parties, and converted the contest which had begun for the interests of the people into a court cabal. Turenne was gained over by the queen-regent, De Retz by Cardinal Mazarin, and Condé was obliged to flee for safety into Guienne. Meanwhile, Louis XIV., who had now attained his 14th year, endeavored to induce the Prince of Condé to return; but the latter, mistrusting these overtures, repaired to Bordeaux 1651, where he had many adherents, whence he commenced a regular war against the court, which might have had dangerous consequences, had not Turenne opposed the prince. 1652, July 2, an engagement took place between the two parties in the neighborhood of Paris. Condé was on the eve of being defeated, when the gates of Paris were opened to him by the courage and zeal of his sister, the Duchess of Longueville, and thus a new turn was given to the contest. Paris itself, weary of these fruitless dissensions, now entered into negotiations with the court, demanding the final removal of Mazarin, who had meanwhile returned. This demand was complied with by Louis XIV., and a general amnesty proclaimed. Condé, who refused to enter into the compact, relying upon an army of 12,000 men placed at his disposal by Charles, Duke of Lorraine, quitted Paris Oct. 15, 1652, and repaired to Champagne; and finally, finding no one disposed to take up arms in his cause, entered the Spanish service, for which he was declared a traitor. Soon afterward, Mazarin returned to Paris, and was again intrusted with the reins of government. Thus the royal power came forth victorious from this long contest, which, though it seemed to commence for the popular interests, gradually changed into a miserable party strife among the nobles. Compare Ste-Aulaire's *Histoire de la F.* (1827, 2d ed; 1860); Fitzpatrick's *Great Condé and the F.* (1873).

FRONDEUR, n. *fröng-dér'* [F. partisan of the *Fronde*; a slinger]: member of the *Fronde*; member of the opposition; opponent of the government.

FRONS, n. *frönz* [L. the forehead]: that part of the face which extends from one temple to the other, and in a vertical direction from the roots of the hair and the superciliary ridges.

FRONT, n. *frünt* [OF. *front*—from L. *frontem*, the forehead or forepart: comp. Pol. *przod*, forepart]: the forepart of anything; the part or place before the forepart; the face or whole face; the most conspicuous part; impudence or boldness: V. to have the face toward; to stand opposed or opposite; to stand foremost: ADJ. relating to the face or

FRONTENAC—FRONTINUS.

front. FRONT'ING, imp. front to front or opposite. FRONT'ED, pp. formed with a front. FRONT'LESS, a. having no front. FRONT'AGE, n. -āj, the front part of a building. FRONT'AL, a. -āl, pertaining to or connected with the forehead: N. a small pediment over a door or window; that which hangs in front; an antependium. FRONTAL BONE: see SKULL.—FRONT'INGLY, ad. -lī. FRONT'LET, n. [dim. of *front*]: a band worn on the forehead. FRONT VIEW, the representation of the front part or elevation of a building.

FRONTENAC, *frōng-tēh-nāk'*, LOUIS DE BUADE, Comte DE: 1620–1698; b. France: gov.gen. of Canada. He received a milit. education, served at the age of 15 under the Prince of Orange in Holland, became col. of a Normandy regt. when 23, and soon afterward brig.gen. In 1672 he was appointed by Louis XIV. gov.gen. of Canada and all the territory embraced in the province of New France. His administration was hampered by the jealousy of the king, insubordination of the gov. of Montreal, hostility of the Jesuits, and treachery of his colleague. In 1682 the king recalled both F. and his colleague, Duchesneau, but in the following year, alarmed at the ruin F.'s successors had brought upon the country, he personally entreated F. to resume the govt. His first movement was to restore a feeling of security from attack by the Iroquois Indians, who had burned and ravaged the upper part of the island of Montreal and spread consternation everywhere, and this he did by punishing them severely. He sent three expeditions against the English, destroyed their marine in Hudson Bay, overran Newfoundland, captured Penaquid, Casco, Salmon Falls in Me., and Schenectady, N. Y., and signally defeated the attempt of the English under Sir William Phips to take Quebec 1690. He heartily promoted the expeditions under La Salle, Marquette, and Joliet, and gave to New France a vigorous and effective government.

FRONTIER, n. *frōn'tēr* [F. *frontière*—from mid. L. *frōntēriā*, a boundary line—from *frontem*, the forepart]: the boundary of a country or state; the parts adjacent to a boundary of a country: ADJ. bordering; lying on or near the boundary.—SYN. of 'frontier, n.': border; boundary; bound; confine; precinct; limit; purlieu; marches.

FRONTIGNAC, or FRONTINIAC, n. *frōn'tēn yāk*: a wine made at Frontignan in Herault, France.

FRONTINUS, *fron-tī'nūs*, SEXTUS JULIUS: Roman author in the second half of the 1st c.: d. abt. A.D. 105. He was sent to Britain A.D. 75, as governor of that island, and obtained a great reputation by his conquest of the Silures, and his vigorous maintenance of the imperial authority. He appears to have been twice consul, and to have held several other important offices. Several works are attributed to F., only two of which are certainly genuine, *Strategematicon*, treatise on the Art of War, in four books; and *De Aqueductibus Urbis Romæ*, in two books. The best edition of the first is that of Oudendorp (reprinted with emendations 1779); of the second, that of Doderich (Wesel

1341). *De Aquæductibus* is an important contribution to the history of architecture.

FRONTISPIECE, n. *frŏn'tis-pēs* [F. *frontispice*—from mid. L. *frontispiciūm*, the forefront of a house—from L. *frons* or *frontem*, the forepart; *spēc'io*, I view]: the ornamental illustration or engraving which faces the first page or title of a book; the part which first meets the eye.

FRONTO, *frŏn'to*, MARCUS CORNELIUS: born at Cirta, in Numidia; went to Rome in the reign of Emperor Hadrian, where he soon obtained high reputation as a teacher of eloquence; died, it is supposed, abt. A.D. 170. Antoninus Pius intrusted to him the education of Marcus Aurelius and Lucius Verus, both of whom always retained the warmest admiration of their preceptor. F. gradually rose to the highest offices of the empire, and became very wealthy. For a long period nothing was known of F. as an author, except from a few fragments of a grammatical treatise (*De Differentiis Vocabulorum*); but in 1814, Cardinal Angelo Mai discovered in the Ambrosian Library at Milan a palimpsest, which, being deciphered, was found to contain a considerable number of F.'s letters with some short essays. These were published by Mai 1815; and in the following year an edition was published at Berlin by Niebuhr, who wrote a critical preface, and also printed the commentaries of Buttmann and Heindorf. A few years afterward, Mai found in the library of the Vatican at Rome another palimpsest containing more than 100 of F.'s letters. The result was a new edition of F. by Mai (Rome 1823), embodying the new discoveries, republished at Celle in Germany (1832). The contents of these letters are on the whole unimportant, though they help to confirm the good opinion which history has formed of Emperor Marcus Aurelius; the style is vapid and declamatory.

FRONTON, n. *frŏng'tŏng* [F.]: the decorated entrance to a building, consisting of a cornice supported by consoles and surmounted by a pediment.

FORE, a. *frŏr*, or FRORY, a. *frŏ'rŕi* [AS. *freosan*, to freeze; *froren*, pp. frozen: Dut. *vroor*, frozen]: in OE., frosty. FROBN, a. *frŏrn*, frozen.

FROSDORF, *frŏsh'dŏrf* (originally *Crottendorf*), called by the French *Frohsdorf*: village in Lower Austria, somewhat more than 30 m. from Vienna, and not far from the frontier of Hungary, on the right bank of the river Leitha. It is celebrated for its splendid castle which in recent times has acquired political importance, from having been after 1844 the residence of the Duchess of Angoulême and the rendezvous of the elder Bourbon party. After the death of the duchess it came into the possession of the Comte de Chambord (see CHAMBORD, COMTE DE), who greatly beautified the interior.

FROSINONE, *frŏ-sē-nŏ'nā* (the *Frusino* of the Volscians): town of Italy in the former States of the Church, on the slope of a hill above the junction of the river Cossa with the Sacco, about 48 m. e.s.e. of Rome, on the high-road between Rome and Naples. It is the cap. of a delega-

FROST.

tion of the same name, formerly notorious for brigandage. The only interesting edifices are the palace of the papal delegate and the remains of an ancient amphitheatre. The costumes of F. are among the most admired of Italy. Pop. about 8,000.

FROST, n. *fröst* [AS. *forst*; Dut. *vorst*; Icel. *frost*; Ger. *frost*, frost: F. *frisson*, a shudder: from *froze*, the pt. of *freeze*, which see]: the power, act, or state of freezing; frozen vapor or dew, as *hoar frost*: V. to adorn with the appearance of frost. **FROST'ING**, imp.: N. the sugar composition resembling hoar-frost, used to cover cakes, etc. **FROST'ED**, pp.: **ADJ.** covered with anything resembling hoar-frost in color or form; having white or gray hairs. **FROSTILY**, ad. *frös'ti-lī*. **FROS'TINESS**, n. **FROSTY**, a. *frös'tī*, containing frost; very cold; freezing; gray-haired; hoary. **FROST-BITE**, the effects of excessive cold on a part of the surface of the body, resembling a burn. **FROST-BITTEN**, affected by frost. **FROST-BOUND**, bound or confined by frost. **FROST-WORK**, work resembling hoar-frost on plants.

FROST: popular name for the effect of a freezing temperature on the surface of the earth. A more scientific use restricts the application of the term to the above when the cold is produced in principal measure by radiation from the earth's surface. Dew is moisture deposited from the air as it becomes chilled by contact with the cold earth. If the cold is intense enough, instead of liquid dew solid ice is formed. this is termed frost. F. is not generally frozen dew as frequently stated. The moisture in the air by refrigeration often passes at once to the solid state and then appears as hoar-frost. Everything that favors radiation of heat tends to produce F. if the general temperature is low enough. A clear sky, with a slight breeze has this tendency; dark soils, and the leaves of plants are good radiators and hence show it readily. Radiation of heat may naturally be prevented by spreading a screen over the surface. Hence in France and elsewhere gardeners often protect their plants at night by stretching canvas screens over a framework that supports them a short distance above the soil. Clouds have the same effect; a cloudy night is not favorable to the production of frost. There is no question that every night in the year would be characterized by great cold were it not for the aqueous vapor in the air, so that owing to its presence the radiation of heat from the earth is not sufficient to produce F. in summer. But on the other hand were the air perfectly dry or free from aqueous vapor no hoar-frost could be produced, though the temperature at night would fall far lower than at present. Large bodies of water by absorbing heat in the day and giving it off at night, exercise a protecting influence on their vicinity. Large lakes cause the land bordering them to be favorable for cultivation of delicate plants and trees. The frostwork deposited on window panes is independent of radiation and is due to cooling of the air of the room as it strikes the glass, with consequent deposition of moisture, which freezes on the glass. See

FROST-BITE—FROSTBURG.

ATMOSPHERE: DEW: EVAPORATION: METEOROLOGY: SNOW.

FROST'-BITE: effect of cold depressing the vitality of a part or the whole of the body. The frost-bitten part is at first blue and puffy, from the current of blood through it being suspended; then should the cold be continued, it becomes pallid, and the painful tingling gives place to numbness and insensibility, and finally to actual death or mortification. Although a sudden violent application of cold may cause death of the tissues, by reducing the temperature to a degree incompatible with animal life, the most common cause of the destructive effects of F.-B. is undoubtedly the excessive reaction which occurs on sudden removal of the cold or application of heat; this is especially the case with moist cold. Baron Larrey believed that 'cold was merely the predisposing cause of F.-B., and mentions that after the battle of Eylau the French soldiers did not experience any painful sensations during the severe cold varying from 10° to 15° below zero of Reaumur's thermometer; but when the temperature rose from 18° to 20° , they felt the first sensations of cold, and applied for succor, complaining of acute pains in their feet, and of numbness, heaviness, and prickings in the extremities. The parts were scarcely swollen, and of obscure red color. In some cases, a slight redness was perceptible about the roots of the toes, and on the back of the foot; in others, the toes were destitute of motion, sensibility, and warmth, being already black, and, as it were, dried.' Those of the men who indulged in the warmth of the bivouac fires suffered from F.-B. in much larger proportion than their more hardy comrades. Cases of F.-B. in this country are not usually severe, the most common being chilblains (q.v.); though some severe cases and even fatal cases are reported every winter; and severe cases present themselves at the hospitals in the persons of houseless, ill-nourished unfortunates, whose constitutions have in many instances been enfeebled by strong drink.

The treatment of F.-B. consists in coaxing back by degrees the vitality of the part; this is most prudently effected by friction, at first with snow, then with water at ordinary temperature, no warmth being applied for some time. As the coldness subsides, the painful tingling returns, then redness and heat; in a short time the latter will be above the natural standard, and if not moderated the part will inflame, and perhaps mortify. It is well to remember that the part need not have been actually frozen for these symptoms to occur. The person with languid circulation who, coming home with cold, wet feet, places them before the fire or in warm water, may be 'frost-bitten' to all intents and purposes.

FROSTBURG, *fröst'bürg*: village of Alleghany co., Md.; on the Cumberland and Piedmont railroad, 17 m. w. of Cumberland. It is between Savage and Davis mountains, on a plateau 1,255 ft. above Cumberland, 1,792 ft. above tide-water, and directly over the great coal basin of

FROTH—FROTH-FLY.

w. Md. Contains 10 churches, 2 iron foundries, a fire-brick factory; derives its chief importance from coal-mining. Pop. (1880) 4,057; (1890) 3,565; (1900) 3,526.

FROTH, n. *fróth* [Icel. *frauth*, scum: Dan. *fraade*; Sw. *fradga*, froth: Low Ger. *frathen*, steam, vapor: W. *ffrydio*, to stream, to gush]: the small bubbles formed on the surface of a liquid by fomentation or by agitation; foam; a showy pretense of knowledge or ability; anything light or unsubstantial: V. to throw up foam or bubbles. **FROTH'-ING**, imp. **FROTHED**, pp. *frótht*. **FROTHY**, a. *fróth'i*, full of froth; consisting of light bubbles; light; empty; unsubstantial. **FROTH'ILY**, ad. *-lī*. **FROTH'INESS**, n. the state of being frothy; emptiness. **FROTH'LESS**, a. destitute of froth.

FROTH'-FLY, or **FROTH'-HOPPER**, or **FROG'-FLY**, or **FROG'-HOPPER**: common names of those insects of which the young—larvæ and pupæ—are found in a frothy exudation on plants. They form the family *Cercopidæ* of the order *Homoptera*, and are allied to *Aphides*, and still more nearly to *Cicadas* and Lantern-flies. The larvæ and pupæ differ little in appearance from the perfect insect except



Frog-Hopper (*Aphrophora spumaria*):
a, larva; *b*, perfect insect, with wing-covers closed; *c*, perfect insect, in the act of flight; *d*, the froth on a plant.

that it possesses wings, which are four in number, and large. The frothy exudations in which they live are produced from the juices of the plants on which they are found; and as they are often in great numbers, crops of

FROTHINGHAM—FROUDE.

various kinds are not unfrequently destroyed or much injured by them, the plants being weakened by loss of sap. They have a proboscis adapted for piercing the bark of the plants on which they feed. They all are small and have considerable leaping powers. The frothy exudation is called sometimes CUCKOO-SPIT, sometimes FROG-SPITTLE, from fancies as to its origin. It is sometimes so abundant, particularly on willow-trees, that persons walking beneath are wetted by its continual dropping. In tropical countries, the *Cercopidæ* are still more plentiful. Some of the tropical insects of this family are remarkable for their extraordinary forms, resulting from peculiar developments of



Bocydium Cruciatum. *Bocydium Globulare.*

the first segment of the thorax. This is particularly the case in the genus *Bocydium*, of which two species are here figured.

FROTHINGHAM, *froth'ing-am* OCTAVIUS BROOKS: author: son of NATHANIEL LANGDON F., D.D.; b. Boston. 1822, Nov. 26. He graduated at the Boston Latin School. Harvard Univ. 1843, and Cambridge Divinity School 1847, was ordained pastor of the North (Unit.) Church, Salem, Mass., 1847, Mar. 10; was pastor in Jersey City 1855-59; and of the Third Unit. Congl. Church (which he organized in New York, 1859) until the society was dissolved 1879. He spent 1879-81 in European travel, and on his return settled in Boston, and applied himself to literature. He was one of the founders (1867) and he was pres. from its organization of the Free Religious Assoc. (see FREE RELIGION), and he actively advocated rationalistic ideas in theology. Of late years his views seemed not so extreme as formerly. F. was art critic of the New York *Tribune* for a year, was a contributor to the Boston *Index*, the free religious organ, from 1880; he published nearly 200 sermons and lectures, and is author of *Stories from the Lips of the Teacher* (1863); *Stories of the Patriarchs* (1864); *A Child's Book of Religion* (1866); *The Religion of Humanity* (1873); *The Life of Theodore Parker* (1874); *The Safest Creed* (1874); *Transcendentalism in New England* (1876); *The Cradle of the Christ* (1877); *Life of Gerrit Smith* (1878); *Life of George Ripley* (1882); and *Memoir of William Henry Channing* (1886). He d. 1895, Nov. 27.

FROUDE, *frôd*, JAMES ANTHONY, LL.D.: English historian: 1818, Apr. 23—1894, Oct. 20; b. Totness. He studied at Oriel College, Oxford, where he took his degree 1840; and 1842 was elected a fellow of Exeter College. Having

FROUNCE—FROWN.

abandoned his original intention of entering the ministry, he published, 1847, a volume of stories, entitled *The Shadows of the Clouds*; and two years later, *The Nemesis of Faith*, a work in which the solemnity and sadness of religious skepticism are relieved by a singularly tender and earnest humanity. The book was written with great and even startling power, and not only cost F. his fellowship, but also a situation to which he had just been appointed in Tasmania. F., for the next few years, employed himself in writing for *Fraser's Magazine* and the *Westminster Review*. His *History of England from the Fall of Wolsey to the defeat of the Spanish Armada*, appeared 1856-69. The peculiarity of this work consists in its use of the state documents of the time, the study of which led F. to reverse not a few historical verdicts, especially that upon Henry VIII. The justness of his views on these and other points has been keenly disputed. Four volumes of *Short Studies on Great Subjects* appeared 1867-82. F. was elected rector of St. Andrews Univ. in 1869, and received the degree LL.D. For a short time he was editor of *Fraser's Magazine*. *The English in Ireland in the Eighteenth Century* was published 1874 (new ed. 1881). In 1874, and again in 1875, F. visited the British s. African colonies on a mission from the home government; the result is embodied in his *Two Lectures on S. Africa* (1880). As Carlyle's literary executor, F. edited his *Reminiscences* (1881), and Mrs. Carlyle's *Letters* (3. vols. 1882); and in 1882 and 1884 he published the biography of Carlyle in four volumes. By giving to the world the copious personal criticism and unpleasant family details contained in these works, he provoked doubts as to his discretion, and in some quarters severe censure. *Oceana* (1886), gives some of his observations during a voyage round the world, dealing mainly with Victoria, New South Wales, and New Zealand. He was appointed prof. hist. Oxford 1892.

FROUNCE, v. *frowns* [F. *froncer*, to plait, to wrinkle—from mid. L. *frontiārē*, to wrinkle—from L. *frontem*, the forehead, the front: Dut. *fronssen*, to plait]: to frizzle; to form wrinkles in or upon. **FROUN'ING**, imp. **FROUNCED**, pp. *frownst*. *Note*.—Skeat says **FROUNCE** is the older form of **FLOUNCE**.

FROUZY, or **FROUSY**, a. *frow'zī* [probably from OE. *frow*; Ger. *frau*, a woman, as a contemptuous name]: fetid; musty; dim; cloudy; dirty and untidy.

FROW, n. *frow* [Ger. *frau*; Dut. *vrouw*]: a woman; a dirty woman; a slattern.

FROW, n. *frō*: a cleaving tool used by coopers.

FROWARD, a. *frō'wērd* [AS. *fram*, Icel. *frá*, Dan. *fra*, from; and *ward*]: perverse; refractory; unyielding; disobedient. **FRO'WARDLY**, ad. *-lī*. **FRO'WARDNESS**, n. peevishness; perverseness.—**SYN.** of 'froward': peevish; petulant; cross; wayward; perverse; untoward; unyielding; ungovernable.

FROWN, n. *frown* [OF. *frogner*, to look sourly on: prov. Sw. *fryna*, to grin: It. *grignare*, to snarl]: a contraction of the forehead, expressing anger or dislike; a look

FROWY—FRUGAL.

expressing displeasure: V. to express displeasure or anger by contracting the forehead; to express displeasure in any significant way; to scowl at or on. FROWN'ING, imp.: ADJ. knitting the brows in anger or displeasure. FROWN'ED, pp. *frown'd*. FROWN'INGLY, ad. *-lī*, with a look of displeasure; sternly.

FROWY, a. *frow'ī* [Gael. *frogach*, fenny, marshy]: in OE., damp; clammy; marshy.

FROZE, pt. *frōz* [see FREEZE]: did freeze. FROZEN, pp. a. *frō'zn*, congealed by cold; frosty; chill. FROZEN ZONES, the extreme n. and s. zones of the earth, called respectively the arctic and antarctic.

FROZEN STRAIT: body of water 15 m. wide, separating Southampton Island, in the north of Hudson Bay, from Melville Peninsula. It is almost constantly impervious to navigation.

FRUCTIDOR, *frūc-tī-dōr* (Eng. 'fruit-month'): name given in the republican calendar of France to the period Aug. 18—Sep. 16: see CALENDAR.

FRUCTIFY, v. *frūk'tī-fī* [L. *fructifier*—from mid. L. *fructificāre*, to be fruitful—from L. *fructus*, fruit; *fāciō*, I make]: to render productive or 'fruitful; to bear fruit. FRUCTED, in *her.*, applied to trees represented as bearing fruit. FRUC'TIFYING, imp. FRUC'TIFIED, pp. *-fīd*. FRUC-TIFICA'TION, n. *-fī-kā'shūn* [F.—L.]: the act of rendering productive of fruit; in *cryptogamic botany*, those parts of a plant which embrace the organs of generation—i.e., flowers and fruit. FRUCTIF'EROUS, a. *-tīf'ēr-ūs* [L. *fērō*, I bear]: bearing fruit. FRUCTESCENCE, n. *frūk'tēs'ēns*, the time when the fruit of a plant arrives at maturity.

FRUCTOSE, or FRUIT'-SUGAR (known also as INVERTED SUGAR): a substance occurring in association with glucose, or (according to the recent investigations of Buignet) with cane sugar in many ripe acidulous fruits. In its composition, and in most of its properties, it closely resembles glucose, from which, however, it differs (1), in being incapable of crystallization; and (2), in its action on polarized light; while both glucose (or grape-sugar) and cane sugar exert a right-handed rotation upon a ray of polarized light, this variety of sugar exerts a left-handed rotation: and hence the term *inverted* has been applied to it. The composition is represented by the formula $C_{12}H_{24}O_{12}$. When boiled with dilute acids, F. combines with the elements of water, and passes into glucose. A similar passage of this substance into glucose sometimes occurs spontaneously, as is seen in the gradual crystallization of the sugar in dried fruits. F. appears to be procurable only from cane-sugar (or sucrose) by the action either of acids or of a peculiar albuminous ferment which exists in the juice of many ripening fruits.

FRUGAL, a. *frō'gāl* [F. *frugal*—from L. *frugālis*, thrifty: It. *frugale*]: economical in living; not lavish; sparing. FRU'GALLY, ad. *-lī*. FRUGAL'ITY, n. *-gāl'ī-tī* [F. *frugalité*]: prudent economy; a prudent and sparing use



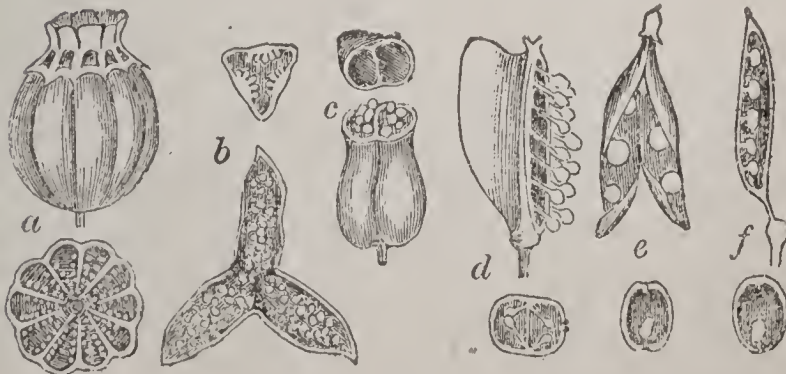
Common Frog (*Rana temporaria*).



Frontal.



Fronton.



Fruit.—*f*, Follicle; *e*, Legume; *d*, Silicula; *c*, Capsule of herbaceous; *b*, of violet; *a*, of poppy.

FRUGIFEROUS—FRUGONĪ.

of anything; thrift.—SYN. of 'frugal': economical; saving; thrifty; parsimonious.

FRUGIFEROUS, a. *fró-jǫf'ér-ŭs* [L. *frŭgĭfĕr*, fruit-bearing—from *frux*, fruits of the earth; *fĕrō*, I bear]: bearing fruit. FRUGIV'OROUS, a. *-jǫv'ō-rŭs* [L. *voro*, I devour]: feeding on fruit.

FRUGIVORA, n. *fró-jǫv'ér-a* [L. *frux*, fruit; *voro*, I devour]: section of the mammalian order *Cheiroptera* (bats). It contains but one family, *Pteropidæ*.

FRUGONI, *fró-gō'nē*, CARLO INNOCENZO: 1692–1768; b. Genoa: versatile Italian poet. He was educated for the church. In 1716 he began to teach rhetoric at Brescia; 1719 he taught in Genoa, and subsequently at Bologna. At the court of Parma, through the patronage of the Cardinal Bentivoglio, he was appointed poet laureate, the stated and prescribed compositions of which post were highly uncongenial to his original and discursive muse; nevertheless the Dukes of Parma showed him particular favor. In 1733, Pope Clement XII. released F. from his spiritual vows. He had returned to Genoa, but afterward, some poems in praise of the Spaniards caused him to be reinstalled in his former post at the Parmese court. His numerous writings were published at Parma 1779, and a complete edition at Lucca 1779: a selection appeared at Brescia 1782.

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FRUIT, n. *frôt* [F. *fruit*—from L. *fructus*, fruit, produce—from *frŭor*, I enjoy: It. *frutto*]: whatever the earth produces for food, clothing, or profit; the edible produce of a tree or plant; that which is produced; effect, good or ill; advantage; profit: V. to produce fruit. **FRUIT'ING**, imp.: **ADJ.** producing fruit; pertaining to fruit: N. the bearing of fruit; offspring. **FRUIT'AGE**, n. *-āj*, the fruit of one season, as the apple or vine. **FRUIT'ERER**, n. *-ér-ér*, a dealer in fruits, as apples, oranges, grapes, strawberries, etc. **FRUIT'ERY**, n. *-ér-ì*, a place for keeping fruit; fruit collectively taken. **FRUIT'FUL**, a. *-fûl*, producing fruit; fertile; abundant. **FRUIT'FULLY**, ad. *-lî*. **FRUIT'FULNESS**, n. productiveness; fertility. **FRUIT'LESS**, a. barren; unprofitable; useless. **FRUIT'LESSLY**, ad. *-lî*. **FRUIT'LESSNESS**, n. barrenness. **FRUITY**, a. *frôt'ì*, having the odor, taste, or appearance of fruit. **FRUIT'INESS**, n. **FRUITICIST**, *frôt'ì-sist*, one who favors classifying plants according to their fruit; a fruitist. **FRUIT-BEARING**, producing fruit. **FRUIT-METER**, a person officially appointed to examine all fruit brought into the market. **FRUIT-SUGAR** (see **FRUCTOSE**). **FRUIT-TREE**, a tree producing fruit, as opposed to a timber-tree.—**SYN.** of 'fruitful': prolific; productive; fecund; plentiful; rich; plenteous;—of 'fruitless': vain; ineffectual; barren; abortive; idle; profitless.

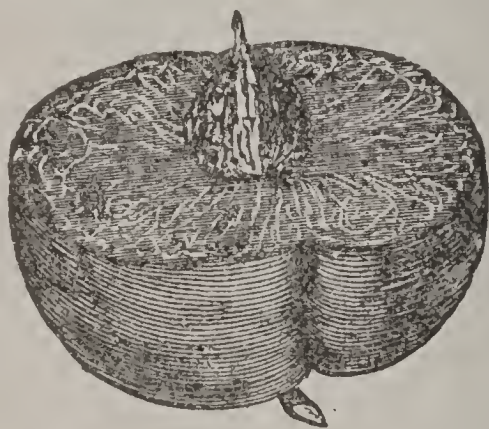
FRUIT: in the botanical use of the term, in phanerogamous plants, a mature ovary containing a seed or seeds; and in cryptogamous plants, a spore-case (*sporangium* or *theca*) containing spores. Other parts of the flower, most frequently the calyx, sometimes remain after flowering is over, undergo a further development, become incorporated with the ovary, and form part of the fruit. The development of the F. in phanerogamous plants depends upon the fertilization of the ovules, and when this has not taken place, the flow of sap to the ovary usually soon ceases, and it drops off with all the other remains of the flower; though there are exceptional cases of seedless fruits, as seedless oranges, bananas, grapes, barberries, etc., in which, however, it may be supposed that fertilization takes place, and that unknown causes afterward operate to prevent the development of the seed, and to direct the flow of sap more exclusively to the nourishment of the succulent parts which are thus increased and improved. This supposition is rendered more probable by the circumstance that the production of seedless fruits appears to be at least sometimes a consequence of age and diminished vigor in trees.

The F., like the ovary, may be composed of one carpel, or of more than one. But the F. sometimes differs from the ovary, through the development of some of the parts, and the non-development or obliteration of others; so that an ovary with several cells may be converted into a one-celled F.; and of several ovules, all but one may become abortive, so as to produce a one-seeded fruit. Thus the three-celled ovary of the oak and the hazel with two ovules in each cell, becomes by the non-development of two cells and five ovules, a F. with one seed; and the two-celled ovary of the ash, and the three-celled ovary of the cocoa-

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nut, likewise produce one-celled and one-seeded fruits. The number of cells may also be increased by the formation of false dissepiments. The structure, too, may be rendered more complex the development of accessory parts, and is usually profoundly modified in ripening, these changes being in direct relation to the dispersal of the seeds. For the various forms of fruits, see Balfour's or Henfrey's *Manual of Botany*; and for classification, see Dickson's *Journal of Botany*, 1871, October.

All that is external to the proper integuments of the seed in the ripe F. is called the *pericarp* [Gr. *peri*, around; and *karpos*, fruit]; and this, which varies extremely in size and other characters, usually consists of three layers, the outermost of which is called the *epicarp* [Gr. *epi*, upon]; the middle one, the *mesocarp* [Gr. *mesos*, middle], or sometimes the *sarcocarp* [Gr. *sarx*, flesh]; and the innermost, the *endocarp* [Gr. *endon*, within]. These parts show great variety, but it is generally the mesocarp which becomes succulent or fleshy, as in the peach, cherry, plum, and other drupes; and in the pear, apple, and other pomes. In drupes, or stone-fruits, the endocarp is the hard shell which immedi-



Drupe (section of a Peach).

ately covers the seed; in pomes, it is the scaly lining of the seed-bearing cavities in the centre; in both drupes and pomes, the epicarp is the outer skin. So in melons, cucumbers, and gourds, the succulent part is the mesocarp, greatly developed, with a thin epicarp and a thinner endocarp. In the orange, however, and all of that family, the epicarp and mesocarp together form the rind, whilst the pulpy cells belong to the endocarp. In berries, as the gooseberry, grape, etc., the pulpy matter does not belong to any of the layers of the pericarp, but is formed from the placentas of the seeds.

When the F., as the fully developed ovary, is considered as a modified leaf or leaves, the epicarp is viewed as representing the epidermis of the lower surface, the endocarp the epidermis of the upper surface, and the mesocarp the substance (*parenchyma*) of the leaf. The midrib of the leaf is traced in the *dorsal suture* of the fruit or of each component carpel, and the *ventral suture* is formed by its folding together and the conjunction of its edges. The dorsal and ventral sutures are very obvious in the pods of pease, beans,

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etc.; and even in fruits formed of several carpels intimately combined, they often become very apparent when the ripened fruit opens to allow the escape of the seeds. The opening or *dehiscence* [Lat. *dehisco*, to open] of fruits takes place in various ways; thus the F. sometimes resolves itself into its original carpels by separation through the *dissepiments*, which divide into two plates forming the sides of the valves, and the carpels further open by their sutures; the pericarp sometimes splits at once by the dorsal sutures of the carpels; sometimes it divides transversely, and throws off a lid; sometimes it opens more partially by pores, etc. Many fruits, however, are indehiscent, some having a very hard pericarp, as nuts, and some having a soft pericarp and much pulp. The decay of the pericarp is in these cases necessarily to the liberation of the seeds, unless when this is accomplished by such means as the F. becoming the food of animals, by which also the seeds of plants are often widely distributed. The decay of the pericarp seems intended, in many cases, to provide the first nourishment for the young plants which spring from the seeds.

A classification of the different kinds of fruits is extremely difficult, though they afford characters of great importance in descriptive and systematic botany. A convenient primary division of fruits is into those formed from one flower, and those formed by incorporation of the ovaries of many flowers. Fruits formed from one flower, by far the most numerous of these two classes, are divided into *apocarpous*, and *syncarpous*, or into *apocarpous*, *aggregate*, and *syncarpous*. Apocarpous fruits are formed of one carpel, and are either dry or succulent, dehiscent or indehiscent, one-seeded or many-seeded. Aggregate fruits, sometimes included among the apocarpous, are formed of several or many free carpels; sometimes dry, sometimes succulent; sometimes arranged on a convex or elevated receptacle; which becomes succulent in the strawberry, and constitutes the edible part of the F.; sometimes within a concave receptacle covered by the enlarged tube of the calyx, as in the rose. Syncarpous fruits are formed of several carpels, intimately united in their mature state, so as to form a berry, capsule, pome, silique, etc. Syncarpous fruits sometimes so completely resolve themselves into their original carpels, that these may be regarded as becoming separate achenia. Fruits formed by incorporation of the ovaries of many flowers (collective or anthocarpous fruits) are sometimes dry, as the cones of firs; sometimes succulent, as the pine-apple, the mulberry, and the fig. For further notice of different kinds of fruits, see particular titles under which they are described, as achenium, berry, capsule, drupe, nut, pome, pod, silique, etc.; also titles of the plants which produce them.

A few plants, particularly the *Coniferae* and *Cycadaceae*, produce seeds really naked or destitute of pericarp. Many other seeds were formerly often described as naked, in which the pericarp exists intimately incorporated with the seed, as the seeds of grasses, *Boraginaceae*, *Labiatae*, *Umbelliferae*, etc. Their real nature is often made apparent by some trace of the style

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The production of ripe F. is exhaustive to the energies of a plant, and plants ordinarily annual may be preserved in life for several years by preventing it. Very young F.-trees generally fail to bring F. to perfection, and the first flowers of melons and gourds are often abortive; while, on the contrary, any circumstance that favors an accumulation of sap in a particular season, tends to render F.-trees unusually productive in the next season, as when all blossoms of a year are killed by frost, or when, from the coldness of the previous summer, flower-buds have not been formed in abundance. While the vital energies of a plant are directed mainly toward the increase of its size, flower-buds are sparingly formed or not at all, as is often the case with F.-trees growing very luxuriantly; and various modes are adopted to cause the production of flower-buds and of F. by checking this luxuriance of growth, as by root-pruning, by cutting into the stem of wall-trees to a moderate depth, or by taking off portions of the bark of the stem. Grafting (q. v.) is also of use in this respect, as well as for the propagation of improved varieties of F.-trees, the qualities of which would, in all probability, not be found exactly the same in their offspring by seed.

In a very immature state, fruits are in general green and soft, and decompose carbonic acid gas in the sunlight, absorbing the carbon, and setting free the oxygen, like leaves and other green parts of plants. As they advance toward maturity, some of them become externally dry and hard, and cease to perform by their surface these functions of vegetation; others, as they become more succulent, change their color, and instead of absorbing carbon and liberating oxygen, absorb oxygen from the atmosphere, and exhale carbonic acid.

It would not be easy to enumerate the peculiar substances produced in fruits. Different parts of the same F. are often extremely different from one another, as the milk and the kernel of the cocoa-nut, its hard shell, and its fibrous husk. Seeds are indeed generally very different in all their qualities from the pericarp or the pulp by which they are surrounded, and the integuments of the seed often not less different from the embryo; of all which a ready illustration may be found in the apple or the grape. The most different chemical products of vegetation are sometimes found in different parts of the same F., giving them the most varied qualities, as wholesome and poisonous; the succulent part of the F. from the kernel of which strychnia is obtained, is said to be harmless; and the seeds of plums contain so much hydrocyanic acid, that to eat many of them would be dangerous; the capsule of the poppy yields opium, but its seed contains nothing of the kind, and is bland and nutritious, abounding in a wholesome fixed oil. The value of fruits to man—which may safely be asserted to exceed that of all other parts of plants—sometimes, as in the grain-plants, depends chiefly on the farinaceous matter of their seeds, containing starch, gluten, etc.; sometimes, as in the banana and bread-fruit, on the starchy matter of the pulpy part; sometimes, as in nuts, on fixed oils; sometimes, as

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in many succulent fruits, on sugar and various acids, with gum, pectine, etc. Other fruits, or parts of the same fruits, are valuable for the volatile oils which they yield, and for peculiar principles capable of application to medicinal and other uses, or making them capable of being used as condiments, perfumes, etc. Coffee, cocoa, pepper, vanilla, and many other articles of commerce, are obtained from fruits.

While some fruits are of the highest value as articles of food, others are generally regarded rather as articles of luxury; yet the abundance of succulent fruits in tropical climates is a bountiful provision for real wants, contributing much to the health of the inhabitants. The coolness of succulent fruits render them peculiarly grateful in the heat of the tropics; their temperature, when newly gathered, being much below that of the surrounding atmosphere.

Cultivated Fruits.—In its popular use, the term F. sometimes has almost the same signification as in the language of botanical science; sometimes it is employed as almost exclusively designating the edible succulent fruits. Of the edible fruits (all of which cannot here be enumerated) many will be found noticed in other botanical articles; they belong to many and very different natural orders, both of endogenous and exogenous, chiefly exogenous plants. Following is a list of the principal cultivated succulent fruits, including those important as food or in commerce.

ENDOGENOUS PLANTS.

<i>Musaceæ.</i>	Plantain and Banana.
<i>Bromeliaceæ.</i>	Pine-apple.
<i>Palmæ.</i>	Date.

EXOGENOUS PLANTS.

<i>Moraceæ.</i>	Fig.
	Sycamore.
	Mulberry.
<i>Aartocarpaceæ.</i>	Bread-fruit.
<i>Lauraceæ.</i>	Avocado Pear.
<i>Solanaceæ</i>	Love-apple, or Tomato.
	Egg-plant.
<i>Sapotaceæ.</i>	Mammee Sapota.
	Sapodilla.
	Star-apple.
<i>Ebenaceæ.</i>	Date Plum.
	Kaki.
<i>Oleaceæ.</i>	Olive. [Differs very much in its nature and uses from all the other fruits here enumerated.]
<i>Vacciniaceæ.</i>	Cranberry.
<i>Cornaceæ.</i>	Cornel.
<i>Myrtaceæ.</i>	Rose Apple.
	Malay Apple.
	Ugni.
	Guava.
	Pomegranate.
<i>Grossulariaceæ.</i>	Gooseberry.
	Red (and White) Currant.
	Black Currant.

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<i>Cactaceæ.</i>	Prickly Pear, or Indian Fig.
<i>Cucurbitaceæ.</i>	Melon.
	Water-melon.
	Cucumber.
	Pumpkin.
	Squash.
	Gourd.
<i>Passifloraceæ.</i>	Granadilla.
<i>Papayaceæ.</i>	Pawpaw.
<i>Rosaceæ.</i>	Apple.
	Pear.
	Quince.
	Medlar.
	Loquat.
	Peach and Nectarine.
	Apricot.
	Plum.
	Cherry.
	Raspberry.
	Strawberry.
<i>Leguminosæ.</i>	Tamarind.
<i>Anacardiaceæ.</i>	Cashew-apple.
	Mango.
	Hog-plum.
	Otaheite Apple.
<i>Rhamnaceæ.</i>	Jujube.
<i>Oxalideæ.</i>	Carambola.
<i>Vitaceæ.</i>	Grape.
<i>Sapindaceæ.</i>	Akee.
	Litchi.
	Longan.
	Rambutan.
	Honey Berry.
<i>Malpighiaceæ.</i>	Barbadoes Cherry.
<i>Clusiaceæ.</i>	Mammee Apple.
	Mangosteen.
<i>Aurantiaceæ.</i>	Orange.
	Lemon.
	Citron.
	Shaddock.
	Forbidden Fruit.
	Lime.
	Wampee.
	Marmelos.
<i>Sterculiaceæ.</i>	Durion.
<i>Anonaceæ.</i>	Custard Apple.

For nuts, and with them some fruits which, though not botanically nuts, resemble them in qualities and uses, see NUT.

Chemical Composition of Fruits.—Our principal knowledge of the composition of different kinds of fruit is due to the important investigations of Karl Remigius Fresenius (German chemist, b. 1818), published in the *Annalen der Chemie und Pharmacie*, 1857. In that memoir he gives the results of more than 50 analyses of different fruits, including gooseberries, currants, strawberries, raspberries, mulber-

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ries, grapes, cherries, plums, apricots, peaches, apples, and pears. The following analyses are selected as representing the composition of some of our most important fruits: (1) the gooseberry; (2) the grape; (3) the cherry; (4) the peach; (5) the apple; (6) the pear. For comparison, the free acid which is present, whether malic, citric, or tartaric (all of which occur in fruits), is calculated as hydrated malic acid.

	1.	2.	3.	4.	5.	6.
Water	85.36	79.98	79.70	82.01	85.04	83.95
Solid Constituents	14.64	20.02	20.30	17.89	14.96	16.05
Soluble.	Glucose and Fruit Sugar.	7.51	13.78	10.70	7.53	7.00
	Free Acid	1.33	1.02	0.56	0.77	1.04
	Albuminous Substances .	0.37	0.83	1.01	0.39	0.22
	Soluble Pectine, Gum, etc.	2.11	0.56	0.67	9.28	2.72
	Soluble Mineral Constituents	0.24	0.46	0.60	0.76	0.44
Insoluble.	Stone or Seeds, }	2.08	2.59	5.73	3.21	0.38
	Skin and Cellulose, }					
	Pectose	0.96	0.94	0.66	1.00	1.16
	Insoluble Mineral Constituents	0.17	0.12	0.08	0.10	0.03

For Glucose and F.-sugar or fructose, see those titles. For coloring matters, fatty or oily matter in a state of suspension, and organic acids in combination with bases, see SOLUBLE PECTINE: GUM: etc.—The following is a brief explanation of the nature of the substances designated in these analyses as pectine and pectose. The term *pectine matters* is applied to a very widely distributed class of substances in the vegetable kingdom, and especially abundant in fleshy fruits and in roots, but whose properties and composition require further investigation. The substance termed *pectose*, which is insoluble in water, occurs in plants, which likewise possess a ferment in solution which converts pectose into *pectine*, which is soluble in water, and is the main constituent of apple and other fruit jellies. (According to Fremy, *pectic acid*, which is closely allied to pectine, is formed in fruits that yield jellies: he has assigned formulas to both these substances, but they are not generally accepted.

The ratio in which the free acid stands to the sugar varies extremely. For a unit of free acid, the sugar is represented by 1.63 in plums, by 3.00 in currants, by 4.37 in strawberries, by 4.93 in gooseberries, by 7.03 in damsons, by 11.16 in apples, by 17.29 in sweet cherries, by 20.18 in grapes, and by 94.60 in pears; the percentage of sugar is least (1.57 per cent.) in peaches, and greatest (14.93 per cent.) in grapes; while the percentage of free acid is least in pears (0.07 per cent.), and greatest in currants (2.04 per cent.).

Fresenius observes, that as all the fruits contain albuminous or proteine matters, they are serviceable as tissue-forming food; but the albuminous matters are present in such small quantity that these fruits will not serve without other nitrogenous food to keep the body in health. Thus, to obtain an amount of albuminous matter equivalent to the contents of one egg, we must eat more than a pound of

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cherries, nearly a pound and a half of grapes, two lbs. of strawberries, more than two and a half lbs. of apples, or four pounds of pears. They are, however, of more use as respiratory or heat-giving foods. Fresenius calculates that 1 pound of starch (equivalent to about 5·5 pounds of potatoes), may be replaced by 5·4 pounds of grapes, 6·7 of cherries or apples, 10·8 of currants, or 12·3 of strawberries. Fruits are, however, eaten not so much for their amount material nourishment, as for their vegetable salts (which are of great therapeutic utility), and for their agreeable flavor. In tracing the connection between the flavor and the chemical composition of fruits, Fresenius finds that the former depends (1) on the ratio in which the acid stands to the sugar, gum, pectine, etc. (the last-named substances making the ratio in which the acid stands to the sugar); (2) on the presence and delicacy of the aroma; (3) on the proportions between the soluble matters, the insoluble matters, and the water; thus, we usually attach the highest value to those fruits which contain the largest amount of soluble, and the smallest amount of insoluble matters—a peach or a greengage almost melts in the mouth, because these fruits are relatively poor in cellulose and pectose; while, on the other hand, bilberries represent the opposite extreme, and are rich in insoluble ingredients; (4) on cultivation, which is found to cause an increase in the quantity of sugar, and a diminution of the amount of free acid and of insoluble matters; (5) on favorable seasons, which augment the sugar and other soluble constituents.

The different berries contain, as a general rule, a larger proportion of free acid than stone-fruit or apples and pears; and their acidity is the more obvious to the taste from their containing relatively small quantities of gum and pectine. The following remarks on some of our common varieties of fruits are of practical value: In *Gooseberries* is recognized an agreeable proportion between the sugar and the acid, the ratio being as 6 to 1 in the sweeter kinds, and 4 to 1 in less sweet varieties of this fruit. The yellow kinds are far richer in soluble ingredients than the red. In *Currants*, the ratio of the sugar to the acid is only about 3 to 1; they are therefore very acid to the taste, and when eaten require the addition of sugar. In *Strawberries*, it is the aroma that is chiefly prized. The ratio of the sugar to the acid varies with the season and the species from 2 to 1 to 6·7 to 1 (in the pine-apple strawberry). A similar remark applies to *Raspberries*. In wild raspberries the ratio is as low as 1·8 to 1, while in cultivated kinds it is as high as 3·5 to 1.

Grapes exceed all other fruits in their amount of sugar, seldom less than 12, sometimes reaching 26 per cent. In good kinds, and in favorable seasons, the ratio of the sugar to the acid is as 29 to 1; in inferior kinds, and in ordinary seasons it is as 16 to 1; when the ratio falls to 10 to 1, the grapes are unripe and acid. In other fruits this would be a high ratio, and they would be regarded as sweet. The anomaly may be thus explained: in unripe grapes the skins are very thick, and contain an extremely acid juice, which overcomes the sugar contained in the interior of the berry.

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The juice of such grapes is far sweeter than the grapes themselves. From their large amount of sugar, and from the fact that their acidity for the most part depends on the acid tartrate of potash, which is almost entirely precipitated from the wine, grapes are incomparably superior to any other fruits in the preparation of wines; and in their fermentation different varieties of ether of a delicate odor are formed, which, in association with volatile oils also present, communicate to the more valued wines their special *bouquet*.—The ratio of the acid to the sugar in the must (the expressed juice before the commencement of fermentation) affords the best evidence of the season. Thus, in the very bad wine-year of 1847, the ration was 1 : 12; in the better wine-year of 1854 it was 1 : 16; while in the good wine-year of 1848 it was 1 : 24, the same kind of grape being experimented upon in all the cases.

Apricots and *Peaches* consist almost entirely of juice, their solid constituents, after the removal of the stone, being only 1 or 2 per cent. These fruits are esteemed both for their juicy and tender flesh, and for their powerful but delicate aroma.

In *Apples* and *Pears*, we have an increased quantity of cellulose and pectine; consequently a relative preponderance of the insoluble constituents. The cellulose contributes to the firmness or hardness of these fruits, while it is to the pectine that they owe their property of gelatinizing when boiled. The well-marked differences of taste, etc., presented by different kinds of apples and pears, are due to the very varying relations that occur between the acid, the sugar, and the pectine, to the greater or less abundance of cellulose, and to the varying nature of the aroma. For equal quantities of sugar, pears contain less acid than apples. In the different kinds of desert apples, the ratio of the sugar to the acid ranges between 12 to 1 and 22 to 1, while in cooking-apples it averages not more than 8 to 1.

For the chemical changes in the fruit during the process of ripening, see **PHYSIOLOGY, VEGETABLE**.

Keeping of Fruit.—After the stage of perfect maturity has been reached fruit soon begins to decay. With some species deterioration commences more quickly and proceeds more rapidly than it does with others, but all kinds are subject to this law of change. By carefully gathering the fruit at the proper time and storing under favorable conditions decay may be retarded, but the tendency being inherent it will quickly assert itself when the surroundings become favorable for its development.

In order to keep fruits in their natural condition as long as possible they should be gathered early. Winter apples should be picked soon after they reach their full size, and before they have assumed the color which indicates that they are fully ripe. Autumn pears are to be gathered as soon as the stem parts easily from the twig when the fruit is raised. A few varieties may be picked still earlier. Winter pears should remain upon the tree until there is danger of sharp frosts. Peaches and similar fruits require gathering

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as soon as they are colored and the side exposed to the sun will yield slightly to pressure. Some varieties of berries will ripen if picked when quite hard and before showing much color, but most sorts should be allowed to just reach maturity on the bushes or vines. In all these cases early picking is to be resorted to merely and only in order that the fruit may be kept as long as possible. For home use, preserving, drying, canning, or any purpose for which extra keeping qualities are not essential, fruit should be well matured on the tree or vine. The only exception to this rule is in the case of pears, some varieties of which are better when ripened in the dark: see PEAR.

For long keeping it is also important that fruit be dry when gathered and that it be handled carefully. A bruise will be likely to cause the speedy decay of the injured specimen, and from this centre the evil will spread. Even when free from bruises fruit which has fallen to the ground should not be placed with that picked from the tree by hand. Its fall may have been due to premature ripening, and its exposure to the moisture of the ground and the rays of the sun have injured both its flavor and its keeping qualities. Only the finest specimens, and those of a uniform degree of ripeness, should be selected for late keeping.

When picked from the tree apples may be placed in large piles on the ground and allowed to remain two weeks or more before being removed to the fruit-room or cellar. They should then be placed in a room in which a uniformly low temperature can be maintained, and in which the air will be dry and pure. They can be kept in barrels, shallow bins, or on shelves. Some growers wrap the finest specimens in tissue paper. Packing in dry chaff or sawdust is often resorted to. Pears should be placed in drawers or on shelves so arranged that the light can be easily excluded. Grapes must be picked as soon as well ripened and all imperfect berries removed, and should be kept cool and dry two or three weeks, or until the stems are dry. They may then be placed in shallow boxes holding not more than 25 pounds each, closed tightly and packed in a cool, dry place. The boxes should be lined with paper, and tissue paper is often placed between the layers of fruit. The Diana, Clinton, and Catawba are among the best keeping varieties: see VINE.

The cold storage system of keeping fruit has been adopted to some extent by large dealers. A house is constructed with double walls, the space between being filled with some non-conducting substance, as sawdust, and the rooms in which the fruit is stored being kept at a uniform temperature of 34 degrees by means of ice placed on an iron floor above. A circulation of air is secured by fans worked by an engine or windmill, and moisture is absorbed by bittern or chloride of calcium sprinkled on the floor. Fruit can thus be kept in perfect condition for an indefinite period, but soon decays when removed to an ordinary temperature.

Among the means for keeping fruit by subjecting it to various changes are drying or evaporation, preserving,

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and canning. The former method is simple, being the removal of water from the fruit, and if quickly and skillfully done gives good results. In preserving, the fruit is cooked and an equal weight of sugar added thereto. Canning in tin or glass vessels is the common method of keeping peaches, berries, and various other fruits. The fruit is cooked, a small quantity of sugar added, the cans are filled while hot, and air-tight covers put on as quickly as possible. For all these methods of preservation it is important that a good grade of well-ripened fruit should be secured.

FRUIT GARDEN.—Distinct from the orchard (q v.), in that it is confined to a more limited area and is devoted in part to the production of the smaller fruits and often also to garden vegetables. From the earliest historic period the garden has been one of the chief sources of pleasure in country life, and in it fruits have always occupied a prominent place. In villages and country towns the fruit garden has also been retained, and it is one of the last features of country life to disappear when the cottage gives place to the city mansion.

Without exception the leading nations of antiquity paid considerable attention to the fruit garden. The Assyrians, Babylonians, and Egyptians were noted for their cultivation of various garden fruits. As evidence of the remarkable prosperity of the Jews during the reign of Solomon it is said that they 'dwelt safely, every man under his vine and under his fig tree.' The Chinese, at a very early period, were eminently successful in their efforts to grow fruit in gardens, and have long been noted for their skill in dwarfing trees. The Greeks and Romans took a great deal of interest in the fruit garden. One of the benefits resulting to Britain and other countries from Roman conquest and occupation was the introduction of superior varieties of fruits and better methods of cultivation. During the middle ages careful attention was paid to fruit-growing by the monks in the spacious and, for the times, well-appointed gardens attached to the monasteries in which their secluded lives were passed.

The first fruit of the cultivation of which we have specific information is the grape, but there is little doubt that the fig, olive, and pomegranate were grown at about the same period, and that melons of various kinds were produced in abundance. It is also probable that most of the leading fruits of the present day were known to people of the ancient world, though the number of varieties was small and their quality was greatly inferior to that of the improved sorts of the present day. It is certain that among the ancient Romans the grape, fig, and olive were commonly and extensively cultivated, and that in the gardens of the rich almost every fruit now grown found a place.

The fruit garden should be located near the dwelling, in order that it may be conveniently reached and because it will be less likely to suffer from neglect than it will if far from the house. A sheltered position is very desirable but if not available wind-breaks of evergreens may be planted at a little distance from the outer edge of the garden. This is of special importance where the more tender varieties of

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fruit are to be grown. If not naturally dry the land should be deeply and thoroughly underdrained. The ground must be finely pulverized and the trees carefully put out: see ORCHARD. Trees may be grown as standards, by far the most common method in this country; as dwarfs, or trained against a wall or trellis: see ESPALIER. Under the former system they require more room and a longer period in which to come into bearing than by either of the latter methods, but a much larger quantity of fruit is produced. The trees are also longer lived and they require less attention than those artificially trained. If the garden is small the varieties of fruit to be grown should be selected with reference to this fact, as trees of some sorts require nearly twice as much room as those of others. In the case of the pear, dwarfed trees (see ORCHARD) can often be profitably set instead of standards. A few choice varieties seem to succeed even better when dwarfed than they do when grown in the ordinary manner. With the apple dwarfing can be successfully performed, but it does not prove as profitable as it does in the case of the pear. The trees are moderately productive but are chiefly valuable for ornamental purposes. Unless the fruit garden is to be maintained more for beauty than for its utility the trees should be set in regular rows and disposed in such a manner as to interfere as little as possible with the cultivation which the growing crops, as well as the trees, require. Even then much care will be needed to prevent injury to the trunks and the large roots when the land is plowed and the other tillage operations are performed.

Small trees should always be obtained for the fruit garden. They are more likely to live than large ones, grow more rapidly, and are in every way more satisfactory. It is well to obtain them from some reliable nursery (see NURSERY) in the vicinity. Varieties should be selected not only with reference to their size and habits of growth, but also with respect to their adaptation to the climate and soil in which they are to be grown. They may be set either in the spring or fall. In some localities the former proves the best time, while in others the latter is usually the most favorable. The work must be carefully done, and for some years the trees will need considerable attention. For details of transplanting and subsequent management, see ORCHARD.

Besides the fruits which may be profitably produced either in the garden or the orchard are several classes which are not suited to the latter location, but which should be abundantly grown in every fruit garden. Prominent among these are the grape, currant, gooseberry, raspberry, and strawberry. Within the past quarter of a century the production of these fruits has been wonderfully increased, and has assumed a great commercial importance. A large number of new varieties have been originated, some of which, both in quality and productiveness, are very great improvements. The land for these fruits should be prepared as carefully as for the trees already noted. The rows should be straight and far enough apart to easily admit of cultivation. In this way more and better fruit will be produced than can be obtained if the plants are so

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crowded as to interfere with thorough tillage. Neither weeds nor grass should be allowed to grow in any portion of the fruit garden. They take the elements of plant food from the soil, injure the fruit in quality and diminish it in quantity, and furnish shelter for many and destructive insect foes. The tillage required to keep the ground free from foul plants will rapidly promote the growth of the crops and would be amply repaid thereby even if the appearance of weeds did not make it imperative.

Fruit Trade.—No complete statistics can be obtained, but it is known that the trade in fruits is of great commercial importance in many of the leading countries of the world, while some of the smaller nations situated in tropical regions derive a considerable proportion of their revenue from this source. In the United States the fruit trade has wonderfully increased during the past quarter of a century, and bids fair to make a steady and rapid growth in future. Vast quantities of fruit are sold in its natural state from farms and orchards every year, while many large growers have evaporators in which they dry their surplus stock. Apples are the most largely grown. They not only supply the domestic market, but large quantities are exported, principally to England. From one to three million barrels of apples, a large proportion of which are grown in the United States, are annually shipped to Liverpool. Other native fruits are sent in great abundance to all our large cities and towns. During the summer special trains bring berries from the south to New York and other great centres of population, and in the autumn fruit trains are run from the peach-growing regions of Del. and N. J. to the same localities. Large quantities of apples, pears, and grapes are also brought to the east from Cal. in cars specially fitted for the purpose. Various citrus fruits of very fine quality are also produced in Cal. and Fla. and sent to other portions of the country. The trade in evaporated apples and peaches is already very large and is rapidly growing, while the dealings in canned fruits have assumed immense proportions in our domestic markets and considerable quantities are sent abroad.

The importation of fruits into the United States is extensive and increasing. With the exception of the citrus fruits it is confined principally to varieties not produced to any extent in our climate. It includes bananas, cocoanuts, currants, figs, plums and prunes, raisins, almonds, filberts, and walnuts. Preserved fruits and jellies are also imported in considerable quantities.

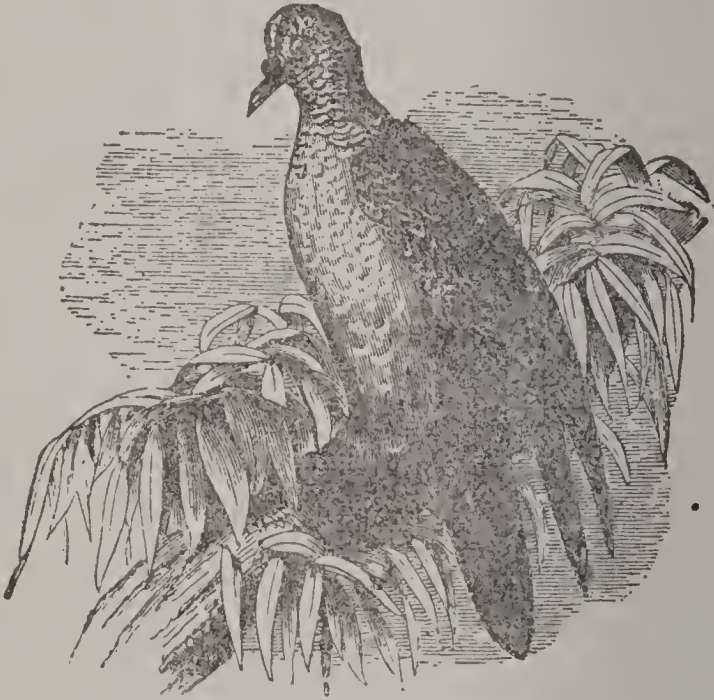
According to the census bulletin 1891, Sep., the principal fruits cultivated in the U. S., with acreage covered and number of trees or plants, were as follows: apple, 20,232 $\frac{3}{4}$ acres, 240,570,666 trees; plum, 7,826 $\frac{1}{2}$ acres, 88,494,367 trees; pear, 6,854 $\frac{1}{4}$ acres, 77,223,402 trees; raspberry, 5,756 $\frac{1}{2}$ acres, 86,487,491 plants; grape, 5,673 acres, 159,139,248 plants; strawberry, 4,433 acres, 271,108,253 plants; then came blackberry, cherry, peach, currant, gooseberry, etc. The market value of the entire product was more than \$100,000,000. The imports of fruit (1895) amounted to \$17,239,923; exports, \$4,971,791.

FRUITIERS—FRUITS.

FRUITIERS (or **FRUYTIERS**) *frü-ê-te-â'*, **PHILIP**: illuminator painter, and engraver; pupil of the Jesuits' (College at Antwerp, who entered the guild of painters in that city 1631: d. 1666, June. He worked in water-colors chiefly, and his pictures were so remarkable for arrangement, drawing, force, and clearness of color, as to secure the admiration of Rubens. He is said to have portrayed the latter and his family. He painted a number of pictures for the church of St. Jacques at Antwerp. Of his own undoubted work, only a series of skilfully etched plates have been preserved.

FRUITION, n. *fró'ish'ûn* [OF. *fruition*; L. *frûor*, I enjoy (see **FRUIT**)]: the pleasure derived from use or possession; enjoyment.

FRUIT-PIGEON (*Carpophaga*): genus of *Columbidæ* (q.v.). having the bill considerably depressed at the base, compressed and moderately arched at the tip, the membrane in which the nostrils are pierced little prominent or swollen, the forehead low, and the feathers advancing on the soft part of the bill, the wings moderately long, the feet,



Fruit Pigeon (*Carpophaga Oceanica*).

particularly the hinder claw, large, and formed for grasping. During the breeding-season, a curious gristly knob grows on the base of the upper mandible of some of the species, and soon afterward disappears. They are birds of splendid plumage, natives of the forests of India, the Indian Archipelago, the warmer parts of Australia, and the islands of the Pacific Ocean. Their food consists of fruits.

FRUITS, in Law: fruits of the soil, in their legal aspect. These fall under various legal categories, and follow different destinations according to their nature, and the situation in which they are placed. If not separated from the soil, they are considered as part of it, and pass with the same upon a change in its ownership. In favor of tenants

FRUMENTACEOUS—FRUMENTIUS.

however, holding under tenancies of uncertain duration, there is an exception which gives them what are termed 'Emblements' that is, a right to gather the crops which they have planted (see EMBLEMENTS). In favor of nursery-men the right exists to remove fruit trees of their own planting from leased premises. See FIXTURES. Fruits which have become separated from the soil, are personal property. In respect to the ownership of fruit on growing trees it may be said 'that trees standing wholly within the boundary line of one's land, belong to him, although their roots and branches may extend into an adjacent owner's land. And such is the case in respect to the ownership of the fruit of such trees, though grown upon the branches which extend beyond the line of the owner's land. And it would be a trespass, for the owner of the land over which the branches extend to prevent the owner of the tree, by personal violence from reaching over and picking the fruit growing upon those branches, while standing upon the fence dividing the parcels. But the adjacent owner may lop off the branches, or roots of such trees up to the line of his land. If the tree stand so nearly upon the dividing line between the lands that portions of its body extend into each, the same is the property in common of the land owners.' (1 Washburn R. P. 13). The malicious injury or destruction of fruit trees is a criminal offense.—See ORCHARD: PLANTATION,

FRUMENTACEOUS, a. *frĕ'mĕn-tĕ'shŭs* [L. *frumentum*, corn or grain: It. *frumento*: F. *froment*]: made of or resembling wheat or grain. FRU'MENTA'TION, n. -*shŭn*, a largess of grain among the anc. Romans. FRU'MENTY, n. -*tĭ* [F. *frumentĕe*—from OF. *froument*, wheat]: a kind of wheat-gruel.

FRUMENTIUS, *frŭ-mĕn'shĕ-ŭs*, SAINT: apostle of Ethiopia and the Abyssinians: b. in Phœnicia toward the beginning of the 4th c.; d. abt 360. At a very early age, he and another youth, named Cœdesius, accompanied their uncle Meropius, Greek philosopher from Tyre, on a voyage for mercantile, or according to others, for scientific purposes. On their return, they landed on the coast of Abyssinia or Ethiopia, to procure fresh water; but the savage inhabitants, under the pretext of their hostility to the Romans, made an onslaught upon them, and murdered Meropius and the whole crew, sparing only the two boys, whom they found sitting under a tree and reading. They were taken as slaves into the service of the king; and made themselves so beloved that Cœdesius was soon raised to the office of cup-bearer, while the more sagacious F. became the king's private sec. and accountant. After the death of the monarch, F. was appointed instructor to the young Prince Aizanes, and in this capacity he obtained a still greater influence on the administration of the state affairs. He aided the Christian merchants who sought these parts, in founding a church, and gradually paved the way for the formal introduction of Christianity. In 326, he went to Alexandria—Cœdesius having returned to Tyre, where he was made



Fruit.—*e, f*, Achenes of buttercup; *c, d*, Caryopsis of oat; *a, b*, Achenes with pappus; *g*, 'Loimentum'; *i, h*, Nutlets and ovary of borage; *l, k*, Umbelliferous type of schizocarp.



Fuchsia.—*a*, Fuchsia Riccartoni; *b*, A garden variety.

FRUMP—FRUTESCENT.

presbyter—and convinced Athanasius, who had recently been nominated bp. of Alexandria, of the necessity of appointing a special ecclesiastical dignitary for Abyssinia, who should carry out vigorously the work of conversion. Athanasius, in full synod, and with its unanimous approbation, consecrated F. himself bp. of Axum (Auxuma). The new bishop repaired to Abyssinia, and succeeded in proselytizing large numbers. He is also supposed to have translated the Bible into Ethiopian: see ETHIOPIA. Afterward he had theological disputations with Theophilus the Arian—F. himself being in all probability an Athanasian. His day is celebrated by the Latins Oct. 27; by the Greeks Nov. 30; and by the Abyssinians Dec. 18. Socrates, i. 15; Rufin, *Hist. Eccl.* i. 9; Theodoret, i. 22; Ludolf, *Hist. Æth.* iii, 7, 17, etc,

FRUMP, v. *frûmp* [an imitative word: It. *frombare*, to whizz: Bav. *rîmpfen*, to shrink, to wrinkle]: in *OE.*, to jeer or mock; to flout: N. in *OE.*, a flout; a jeer; an ill-tempered person; a cross old woman; a grotesque old woman.

FRUSH, a. *frûsh* [F. *froisser*, to bruise—from mid. L. *frietiūrē*—from L. *frictus*, rubbed: It. *frusciare*, to crush together: an imitative word]: in *Scot.* and *prov. Eng.*, easily broken or crushed; dry; crumbling: V. to bruise; to dash violently to pieces. FRUSH'ING, imp. FRUSHED, pp. *frûsh't*.

FRUSH, n. *frûsh* [F. *fourche*, a fork—from L. *furca*, a fork]: a forked ligament growing in the middle of the sole of a horse's hoof: another name for FROG 2, which see. *Note*—In the spelling of the words FRUSH and FROG, the forked ligament in the sole of a horse's hoof, there seems to have arisen a confusion of sound with sense, arising from Ger. *frosche*, Dut. *vorsch*, a frog, and F. *fourche*, a fork.

FRUSTRATE, v. *frûs'trât* [L. *frustrâtus*, disappointed, deceived—from *frustra*, without effect, in vain: It. *frustrare*: F. *frustrer*]: to defeat; to disappoint; to bring to nothing; to render of no effect: ADJ. in *OE.*, of no effect; vain: useless; disappointed. FRUS'TRATING, imp. FRUS'TRATED, pp. FRUSTRA'TION, n. *-trâ'shûn* [F.]: the act of frustrating; disappointment; defeat.—SYN. of 'frustrate, v.': to baffle; disconcert; discomfit; foil; confound; balk; nullify.

FRUSTUM, n. *frûs'tûm* [L. *frustum*, a fragment, a broken piece. It. *frusto*, a little piece. F. *fruste*, defaced]: in *geometry*, the part of a solid next the base, left on cutting off the top by a plane parallel to the base, as a truncated cone: The frustum of a sphere or spheroid, however, is any part of these solids comprised between two circular sections; and the *middle* frustum of a sphere is that whose ends are equal circles, having the centre of the sphere in the middle of it, and equally distant from both ends. FRUSTULES, n. plu. *frûs'tûlz*, in *bot.*, the parts or fragments into which diatoms separate. FRUS'TULOSE, a. *-tû-lôs*, consisting of fragments.

FRUTESCENT, a. *frô-tës'ënt* [L. *frûtices'ens* or *frûticescen'tem*, putting forth shoots—from *frûtex*, or *fruticem*, a

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shrub: It. *frutice*]: growing or becoming shrubby; taking the character of a shrub. FRUTES'CENCE, n. -*ēns*, state of becoming shrubby. FRUTICANT, a. *frôt'ik-ant*, full of shoots. FRUTICOSE, a. *fró-ti-kôs*, or FRU'TICOUS, -*kûs* [L. *fruticōsus*]: shrubby.

FRY, v. *frī* [F. *frīre*, to fry, to parch—from L. *frīgērē*, to roast, to parch]: to heat or roast in a pan over a fire; to cook in a pan; to endure or suffer the action of extreme heat: N. a dish of anything fried. FRY'ING, imp.: N. the process or act of roasting in a pan over the fire (see FOOD AND DRINK). FRIED, pp. *frīd*, cooked by frying. FRYING-PAN, a shallow pan with a long handle for dressing food by frying. OUT OF THE FRYING-PAN INTO THE FIRE, from bad to worse.

FRY, n. *frī* [F. *frai*; OF. *fray*, spawn of fish or frogs: Goth. *fraiv*, seed: Icel. *fríof* or *frjó*, seed]: the young brood of fish lately spawned; a swarm of little animals; *familiarly*, a number of very young children.

FRY, *frī*, ELIZABETH: eminent philanthropist and preacher of the Society of Friends: 1780, May 20—1843 Oct. 12; third daughter of John Gurney, of Earlham Hall, near Norwich, England. Her active and untiring exertions for the help of suffering humanity acquired for her in her lifetime the name of 'the female Howard.' When not more than 18 years of age, she established a school for 80 poor children in her father's house, with his entire sanction. In 1800, at the age of 20, she married Joseph Fry, of Upton, Essex, then engaged in business in London. She had eight children. In the year 1813, the deplorable condition of the female prisoners in Newgate attracted her attention, and she resolved upon visiting them. Alone and unprotected, she entered the part of the prison where 160 of the most disorderly were immured, and addressed them with a dignity, power, and gentleness which at once fixed their attention. She then read and expounded a portion of Scripture, many of those unhappy beings hearing then the word of grace for the first time. It was not, however, till about Christmas 1816 that she began her systematic visits to Newgate, being particularly induced thereto by the reports of the gentlemen who, 1815, originated the 'Society for the Improvement of Prison Discipline.' She instituted a school within the prison walls, provided work for the women, and the means of Christian instruction, and established a committee of ladies for the reformation of women prisoners. The almost immediate result was order, sobriety, and neatness, in place of the riot, licentiousness, idleness, and filth, which had previously prevailed. In 1818, her exertions were directed to making provision for the benefit of women convicts sentenced to transportation. For the relief of women in foreign prisons, she made frequent journeys on the continent of Europe. She interested herself also in the abolition of slavery, the advancement of education, and the distribution of Bibles and tracts. Her labors for the improvement of British seamen, by furnishing the ships of the coast guard and the royal navy with libraries

of religious and instructive books, received the sanction and assistance of government. To the poor and helpless, her charities were unbounded. As a preacher among her own sect, she was held in high estimation; and she often engaged in gospel missions, not only throughout England, Scotland, and Ireland, but to various countries on the continent. She died at Ramsgate, aged sixty-five. Soon after her death, a public meeting was held in London, the lord mayor in the chair, for establishing, as the best monument to her memory, 'The Elizabeth Fry Refuge,' for affording temporary food and shelter to destitute women, on their discharge from metropolitan prisons. See the *Life of Elizabeth Fry*, 2 vols. (1847), published by her daughters, and the short life by Mrs. Pitman (1884).

FRY, JAMES BARNET: 1827, Feb. 22—1894, July 11: b. Carrollton, Ill. He graduated at the U. S. Milit. Acad. 1847, was asst. instructor of artill. at the Acad. a short time, served with the 3rd U. S. artill. in Mexico 1847–8, was reappointed instructor at the Acad. 1853, and was adj. there 1854–59. In 1861, Mar., he was commissioned asst. adj. gen., served on the staffs of Gens. McDowell 1861 and Buell 1862, was appointed provost-marshal-gen. of the U. S. 1863, Mar. 17, and held the office till its abolition 1866, Aug. 30. He was brevetted maj. gen. U. S. A. for distinguished services, 1865, Mar. 13, was adj. gen. of the Div. of the Pacific 1866–69, of the South 1869–71, of the Mo. 1871–73, and of the Atlantic 1873–1881, June 1, when he was retired. Beside official reports, which show that he placed 1,120,621 men in the army, arrested 76,562 deserters, and collected \$26,366,316 during the civil war, he published *Sketch of the Adjutant General's Department, U. S. Army, from 1775 to 1875* (1875); *History and Legal Effects of Brevets in the Armies of Great Britain and the United States, from their Origin, in 1692, to the Present Time* (1877); *Army Sacrifices* (1879); *McDowell and Tyler in the Campaign of Bull Run* (1884); *Operations of the Army under Buell* (1884); and *New York and Conscription* (1885),

FRY, WILLIAM HENRY: 1815, Aug. 10--1864, Dec. 21; b. Philadelphia: musical composer. He received a public-school and collegiate education, studied music, composed four orchestral overtures 1835, which were performed by the Philadelphia Philharmonic Soc.; and won its honorary medal, and became an editor on his father's newspaper, the *Philadelphia Gazette*, 1839. In 1845 he produced *Leonora*, an English opera, which met with popular favor and the hostility of musical critics in Philadelphia and New York. The following year he went to Europe as correspondent for the *New York Tribune* and other newspapers, and to study music, and on his return 1852 was appointed musical editor of the *Tribune* and held the office till death. His *Leonora*, reconstructed for the Italian opera company, was produced in New York 1858, and failed to excite even passing interest, and his *Notre Dame*, brought out in the same city 1864, was also unsuccessful. His other compositions include the music for the opening ode for the industrial

exhibition in New York 1853; the symphonies, *The Breaking Heart* and *A Day and a Country*; a *Stabat Mater*; and *Eleven Violin Quartets*. He was a frequent lecturer on musical, political, and every-day topics.

FRYE, JAMES: 1709-1776, Jan. 8; b. Andover, Mass.: soldier. In early life he held a number of local and state offices and become an active militiaman; 1745 took part in the siege and capture of Louisburg; at the opening of the revolutionary war was commissioned col. of the regt. of Essex (Mass.) vols., participated with them in the battle of Bunker Hill, and commanded the 6th brigade of the army that invested Boston, 1775-6.

FRYE, WILLIAM PIERCE, LL.D.: lawyer: b. Lewiston, Me., 1830, Sep. 2. He graduated at Bowdoin College 1850, studied law with William P. Fessenden, practiced sometime in Rockland, Me., then settled permanently at his birth-place. He entered political life as a republican member of the legislature, serving 1861, 62, 67; was mayor 1866-7; attor. gen of Me. 1867-70; member of congress from the 2d. cong. dist. 1871-81; elected U. S. senator 1881, re-elected 1883, 1888, 1895, 1901; pres. pro tem of the senate 1896 and 1901; member American-Spanish peace commission 1898; for many years member of the senate committee on foreign relations. He was a presidential elector 1864, and a member of the republican national committee since 1872. In 1880, he was chosen a trustee of Bowdoin College, and 1881 received the degree LL.D. from Bates College.

FRYKEN, *frü'ken*: cluster of small lakes in Sweden, n. of Carlstad, 12 m. n.w. of Lake Wener, into which they discharge by the Nars river. They stretch from n. to s. about 40 m., are surrounded by beautiful scenery, have the town of Frykoende at the n. extremity and Frykstaden at the s., and are connected by narrow channels which gives them the appearance of a large river.

FRYXELL, *früks'ël*, ANDERS: 1795-1881, Mar. 21; b. Hesselskog, in Dalsland. He studied at Upsala; took priest's orders 1820; and 1828, became rector of St. Mary's School, Stockholm. He afterward became Profost of N. Vermland, but resigned 1847. F. gained reputation first by his *Berättelser ur Svenska Historien* (Narratives from Swedish History, vols. I.—XVIII., Stockh. 1832-52). These narratives, strung together on something of the same plan as Sir Walter Scott's *Tales of a Grandfather*, are marked not only by patriotic sentiment, but by fresh and natural conception, richness of biographic detail, naive and vivacious execution; they soon obtained a wide popularity in Sweden. The first volumes of this truly national work have been repeatedly published, and have been translated into almost all European languages; for example, into English by Schoultz (1844), into German by Homberg (1843) The part devoted to the history of Gustavus Adolphus has also been translated into German by Homberg (1842-3), into French by Mlle. N. du Puget (1839), and into Dutch by Radijs (Utrecht 1844); and that relative to the History of Gustavus Vasa into German by Ekendahl (1831). F.'s

FUACAM ET FLAGELLUM—FUAD-MEHMED.

Characteristics of the Period from 1592 to 1600 in Sweden obtained a prize offered by the Swedish Academy. Another work, *Om Aristokrat-fördömandet i Svenska Historien* (4 vols. Upsala 1845-50), in which he endeavors to clear the Swedish aristocracy from the accusations urged by Geijer and others, involved him in a keen controversy with the democratic liberal party in Sweden. F. addicted himself to poetry and music also; and his opera *Vermland's Flickan* (or 'The Lass of Vermland'), has proved very attractive to his countrymen. He died at Stockholm.

FUACAM ET FLAGELLUM (Gallows and Whip): the lowest of the servile tenures in feudalism, wherein the bondman was both in limb and life utterly at the mercy of his lord.

FUAD-MEHMED, *fó'ád' mēh'mēd*, Pasha: Turkish statesman and littérateur: 1814-69: b. Constantinople; son of the celebrated poet, Izzet-Effendi-Kitchegizadé, better known under the name Izzet-Mollah; and nephew of Leila Khatum, one of the very few Turkish poetesses. Having received an education more literary than that of the majority of young men destined for public affairs in Turkey, he began to make himself known as an author, when the exile of his father, who had fallen into disgrace with the Sultan Mahmud, and the confiscation of the paternal property, compelled him to choose a profession. He betook himself to medicine, and studied at Galata-Sérai 1828-32; in 1834 was appointed admiralty physician, and accompanied the grand admiral in his expedition against Tripoli; but on his return to Constantinople, he abruptly forsook medicine, and entered the arena of politics. For several years, he employed himself in the study of diplomacy, history, modern languages, the rights of nations, and political economy. In 1840, he became first sec. to the Turkish embassy at London, where his skill and sagacity first made themselves conspicuous. In 1843 he was named second dragoman of the sublime porte, and shortly afterward was chosen to proceed to Spain to felicitate the queen of that country on her accession to the throne. F. was very popular at the court of Madrid. It was almost impossible to believe him to be a Turk. He spoke French marvellously well, made *bon mots* like Talleyrand, and showed himself as gallant as an Abencerrage. Curiously enough, though a *Mohammedan*, he obtained, while in Spain, among other honors, the grand cord of Isabella the *Catholic*. Here also he composed a poem on the Alhambra, which Turkish critics praise highly. On his return to Constantinople, he was appointed grand interpreter to the Porte, which brought him into contact with the Duke of Montpensier, who arrived at Constantinople 1845, and who, on his return to France, invested him with the cross of commander of the Legion of Honor. In 1850 he went on a mission to St. Petersburg, and 1853 on another to Egypt. On his return from the first of these, he became minister of foreign affairs under the grand viziership of Aali Pasha (1852, Aug.). On the question of the 'Holy Places,' F., by his attitude, and by a

brochure very hostile to the pretensions of Russia, entitled *La Vérité sur la Question des Lieux Saints*, gave great dissatisfaction to the czar. In 1854, F. went to Epirus with Omar Pasha, acting sometimes as diplomatist, sometimes as general. In the following year he received the title Pasha, and was again appointed minister of foreign affairs. 1861-66 he held the office of Grand Vizier. To him especially it is said Turkey owes the hattî-sherif of 1856, ordering the consolidation of the external defenses of the Porte and the institution of telegraphs and light-houses.

When the Turkish Acad. of Science and Belles-Lettres was established, 1851, F. was one of the first members, and in the following year he published a *Turkish Grammar*, highly esteemed by native scholars. He was loaded with distinctions by European sovereigns.

FUCA, *fū'kâ*, STRAIT OF: water passage separating Washington Territory from Vancouver's Island, and connecting the Pacific Ocean with the Gulf of Georgia. It has its outer or w. entrance in lat. 48° 10' n., and long. 124° w. It contains several islands, one of which, San Juan, became, 1859, the subject of a dispute between Great Britain and the United States; the question being, whether it was to be regarded as an appendage of Washington Territory or of British Columbia. The question was submitted, 1872, to the Emperor of Germany as arbiter; and he decided that the line of boundary should be run through the Strait of Haro, w. of San Juan, thus awarding that island to the United States.

FUCACEÆ, *fū-kā'sē-ē*: according to Lindley, a nat. ord. of Acotyledonous plants; but generally regarded by botanist as a sub-order of *Algæ*. The species are numerous, about 500 being known, mostly in salt water. They are distinguished from the other algæ by their organs of reproduction, which consist of spores and antheridia, contained in common chambers or conceptacles, which are united in club-shaped receptacles at the end or margins of the fronds. The antheridia contain phytozoa. The frond is sometimes a stalk expanding into a broad blade, and sometimes exhibits no such expansion, and is either simple or variously branched. Many of the F. are provided with vesicles containing air, by the aid of which they float in the water. Some attain great size—*Macrocystis pyrifera* is said to have fronds 500 to 1,500 ft. in length; its stem not thicker than the finger, and the upper branches as slender as pack-thread. Most of the F. contain iodine in considerable quantity, and some are therefore much used for the manufacture of KELP (q.v.), particularly different species of *Fucus*, or Wrack (q.v.), and *Laminaria*, or Tangle. On account of the soda which they contain, they are valuable also as a manure. Some are eatable, containing large quantities of gelatinous matter, as the DULSE (q.v.), TANGLE (q.v.), and BADDERS-LOCKS (q.v.) of the British coasts, and certain species of *Sargassum* in other parts of the world. The medicinal uses of some seems to depend on the iodine which they contain, and which it is now considered preferable to exhibit in other forms, after it has been extracted.

FU-CHOW-FOO—FUCHSIA.

FU-CHOW-FOO, *fó-chow fō'* (Happy City): city and port of China, cap. of the province of Fuh-Keen. It is beautifully situated on the left bank of the Min., 25 m. from its mouth; lat. 26° 3' n., long. about 119° 50' e., and was opened to foreign commerce by the treaty of 1842. The walls of the city are about 30 ft. in height, and 6 m. in circumference, and have seven gates, the gateways of which are of bricks resting on a foundation of granite. The bridge of 40 or 50 arches over the Min. is 12 ft. wide, and about 1,200 ft. long. A Buddhist monastery on Wu-shi-shan has been converted into the city residence of the British consul. The lacquered ware of F. is of special excellence, and the method of preparing it is known to only one family, by whom the secret is jealously kept. The exports during the season of 1881 amounted to 97,455,733 lbs. of tea of the value of about \$21,825,000, of which about two-thirds went to Great Britain. Of the 597 vessels which entered and cleared, 459 were British. The chief imports are lead, cotton, woolen goods, and opium. The duties on foreign trade are greater in amount than those received at any other port in China, except Shanghai. Pop. (1890) 636,000.

FUCHS, *fûhs*, JOHANN NEPOMUK VON: 1774, May 15—1856, Mar. 5 b. Mattenzell. Germany: chemist. He was educated in Freiburg, Berlin, and Paris, became prof. of chemistry and mineralogy in the Univ. of Landshut 1807, conservator of the mineralogical collections at Munich 1823, and subsequently prof. of mineralogy and occupant of several offices in the scientific depts there; retired from official life 1852, and was ennobled 1854. In 1823 he discovered a process for making soluble glass and applying it to the fixing of fresco colors, and the latter method has since been known as stereochromy. See GLASS, SOLUBLE.

FUCHSIA, n. *fū'shĭ-ă* [named after the discoverer, Leonhard von Fuchs, M.D. (1501-66) prof. in the Univ. of Tübingen]: genus of *Onagraceæ* (calycifloral exogens), containing many species, natives of S. America, and of s. parts of N. America. They are half-shrubby plants, shrubs, sometimes climbers, and small trees, and have generally pendulous red flowers; of which the calyx is funnel-shaped, 4-cleft, finely colored; the corolla 4-petalled; the fruit is a 4-celled berry; the leaves are opposite; the flower-stalks 1-flowered, springing from the axils of the leaves, or sometimes forming racemes at the top of the branches. Some of the species, as *F. coccinea*, *F. gracilis*, *F. globosa*, *F. fulgens*, *F. macrostemon*, *F. longiflora*, are much cultivated in gardens and greenhouses for the beauty of their flowers. Some of the species, though too delicate for northern climates and killed to the ground every winter by frost, spring again from the root, and flower beautifully in autumn. A little protection around the root is of great use in preserving them in vigor. All are propagated with extreme facility by cuttings, which has no doubt contributed to their present abundance, even in the gardens or windows of the poor. New varieties and hybrids have been produced in vast numbers, of which those with white

FUCHSIN--FUCIVOROUS.

flowers particularly are prized. The berries of a number of the species have a sub-acid taste, and are eaten in S. America, and preserved with sugar; and they are oc-



Fuchsia.

casionally used thus in some other countries. Where the climate admits, a F. hedge is extremely ornamental. The wood of some species is used in their native regions for dyeing black.

FUCHSIN, n. *fôk'sîn*: red coloring matter derived from rosaniline.

FUCINO, *fô-chē'nō*, LAKE OF, or LAGO DI CELANO, *lû'gô dē chā-lá'nō* (anc. *Fucinus Lacus*): lake of Italy, province of Abruzzo Ultra II.; remarkable as the only lake of any extent in the Central Apennines. It is 10 m. long 7 broad; 2,176 ft. above sea-level. It is subject to sudden risings; and in ancient times, by order of Emperor Claudius, a magnificent subterranean channel more than three m. in length, to carry off the surplus waters, was cut partly through the solid rock of Monte Salviano rising 1,000 ft. above. This tunnel became obstructed in the middle ages, and long remained so, notwithstanding many attempts to clear it. In recent times the surrounding country has been often submerged. In 1855, operations were commenced for the restoration of the Claudian aqueduct, and 1862, Aug. 9, the work was completed. Previous to 1871, about \$100,000,000. were expended upon the drainage of this lake.

FUCIVOROUS, a *fû-siv'ô-rûs* [L. *fûcûs*, sea-weed; *vôrô*, I devour]: eating or living on sea-weed.

FUCO-XANTHINE—FUDGE.

FUCO-XANTHINE, n. *fū'kō-zăn'thîn* [L. *fūcūs*, a rock-lichen, sea-weed: Gr. *xanthos*, yellow]: a brown coloring matter, found in sea-weeds.

FUCUS, n. *fū'kūs*, **FUCI**, n. plu. *fū'sī* [L. *fūcūs*; Gr. *phukos*, rock-lichen, certain sea-weeds used by the ancients in dyeing]: sea-weed or sea-wrack (see **FUCACEÆ**: **WRACK**). **FUCOID**, a. *fū'koyd*, or **FUCOIDAL**, a. [Gr. *eidos*, likeness]: resembling sea-weed. **FUCOIDS**, n. plu. fucus-like impressions. **FUCITES**, n. plu. *fū-sīts'* or *fū-sī'tēz*, a general term for fossil sea-weeds.

FUCUSINE, n. *fū'kūs-în*: $C_{15}H_{12}F_2O_3$. An organic base prepared by boiling fucusamide with aqueous potash for twenty minutes. It forms a yellowish resin.

FUCUSOL, n. *fū'kūs-öl*: fucus aldehydes, $C_5H_4O_2$, or $C_4H_3O \cdot CO \cdot H$; obtained by distilling sea-weed with dilute sulphuric acid and washing the distillate with water.

FUD, n. *fūd* [W. *ffwtog*, a short tail; a scut]: the scut, or tail of a hare, rabbit, etc.; woolen waste; the refuse of the new wool taken out in the scribbling process, which is mixed with the mungo for use.

FUDDLE, v. *fūd'l* [Low Ger. *fuddig*, confused: Ger. *faseln*, to rave or dote: comp. Gael. *fadail*, tedious, a long time]: to sit long over liquor; to make tipsy; to stupefy one's self with drink. **FUDDLING**, imp. *fūd'ling*. **FUDDLED**, pp. *fūd'ld*. **FUDDLER**, n. *fūd'lēr*, one who stupefies himself with drink; a drunkard.

FUDGE, int. *fūj* [prov. F. *fuche*, an imitative word: comp. Gael. *fuidse*, a craven]: an exclamation of contempt; nonsense.

FUEL.

FUEL, n. *fū'ël* [OF. *fuelles*, brushwood—from mid. L. *focālē*; OF. *fouaille*, supply of wood for the fire—from L. *focūs*, a fireplace: F. *feu*, fire]; matter used to produce heat by burning, as in furnaces, grates, or stoves; *fig.*, anything that serves to increase excitement or energy. This term is generally applied to combustibles used for production of heat; also, less frequently, to combustibles such as oil, paraffine oil (q.v.) used for lighting. For details of the physical properties and chemical composition of the various fuels, see COAL: COKE: etc.; following are observations on their economical application as sources of motive power.

The two elementary bodies to which are due the heating powers of all F., natural and artificial, are carbon and hydrogen. Coke, wood charcoal, peat charcoal, and anthracite, contain little or none of the latter element, and may be regarded as purely carbonaceous fuels. But wood, peat, and most varieties of coal, contain hydrogen as well as carbon; and in their combustion, these two substances combine to produce volatile and combustible hydrocarbons, which are volatilized previous to being consumed, while a carbonaceous F. evolves no volatile matter until combustion has been effected. These hydrocarbons are numerous and varied in composition (see CARBOHYDROGENS); but when combustion is perfect, the amount of heat produced by any hydrocarbon is exactly what would have been produced had the hydrogen and carbon been burned separately. It will be of advantage, therefore to study these two elementary combustibles in succession, in order to estimate subsequently the combined effect where they come together in the same fuel.

The heating power of a combustible, or the *amount* of heat generated by it, is usually expressed in degrees Fahrenheit on so many lbs. weight of water. But in estimating the *temperature*, or intensity of heat produced, we have to keep in view that different substances have different capacities for heat—that of water being generally assumed as unity. The number expressing this capacity is called the specific heat of the substance. Water 1000, carbonic acid 221, imply that while 1000 units of heat are required to elevate the temperature of water any given number of degrees, only 221 units are required to elevate to the same temperature an equal weight of carbonic acid.

CARBON AS FUEL.—1. *Amount of air required for combustion.*—Burned in air, carbon combines with the oxygen to form carbonic acid (CO_2), mingled with nitrogen, the other atmospheric element. The chemical change may be thus represented, atomically:

		Products of Combustion.	
Carbon,	6.0	Carbonic acid, Nitrogen,	
Air (69.6) {	Oxygen, 16.0		22.0
	Nitrogen, 53.6		53.6
			<hr/>
			75.6

Or, assuming carbon as unity:

Carbon,	1.000	Carbonic acid, Nitrogen,	
Air (11.6) {	Oxygen, 2.667		3.667
	Nitrogen, 8.933		8.933
			<hr/>
			12.600

FUEL.

Carbon, therefore, requires about 12 times its own weight of air for perfect combustion.

2. *Amount of Heat produced.*—Andrews found that 1 lb. carbon produced heat equal to 1° F. in 14,220 lbs. of water: other observations agree very closely. This may be otherwise stated thus: 1 lb. carbon will raise from freezing to

boiling point (32° to $212^{\circ} = 180^{\circ}$) $\frac{14220}{180} = 79$ lbs. water;

from mean temperature to boiling-point (60° to $212^{\circ} = 152^{\circ}$) $\frac{14220}{152} = 93.5$ lbs. water; will boil off in steam from mean

temperature (60° to $212^{\circ} = 152^{\circ}$, add latent heat in steam, $965^{\circ} = 1117^{\circ}$), $\frac{14220}{1117} = 12.73$ lbs. water; and will boil off

in steam from boiling-point (latent heat in steam, 965°) $\frac{14220}{965} = 14.74$ lbs.

3. *Utmost Temperature or Intensity of Heat from Carbon.*—Here we suppose the combustion effected in a space enclosed by non-conducting material, so that all the heat produced by 1 lb. carbon is retained by the products of its combustion. Caloric sufficient to raise 14,220 lbs. water 1° F. is thus compressed, as it were, into 12.6 lbs. of carbonic acid and nitrogen. To determine the temperature thus produced, we require to know the specific heat of this gaseous compound, that of water being 1.

3.667 lbs. carbonic acid.	Specific heat, .2210
8.933 " nitrogen.	" " .2754
<hr/> 12.600 " products of combustion.	<hr/> Mean sp. " .2596

14,220° on water at 1.000 specific heat, will give 54,776° on these products per lb. weight. Distributed over 12.6 lbs.,

this heat will raise the temperature to $\frac{54776}{12.6} = 4347^{\circ}$ F.,

which is therefore the utmost intensity of heat attainable in burning carbon, supposing no loss by absorption or radiation.

4. *Effect of Excess of Air.*—Excess of air has been proved to have no effect on the *quantity* of heat produced where combustion is perfect; but the intensity of *temperature* is diminished. Suppose two equivalents of air admitted; we then have as the products of combustion—

3.667 lbs. carbonic acid.	Specific heat, .2210
8.933 " nitrogen.	" " .2754
11.600 " air in excess.	" " .2669
<hr/> 24.200 " products.	<hr/> Mean sp. " .2631

14,220° on water = 54,048° on this new mixture of gases. But the heat is now diffused over 24.2 lbs. matter instead

of 12.6 lbs., $\frac{54048}{24.2} = 2234^{\circ}$ F.: the utmost temperature pro-

duced by carbon burned in two equivalents of air.—The utmost temperatures attainable, with various proportions of air are given below; also the appearance which the in-

FUEL.

terior of the furnace would exhibit. Flame at these temperatures will present the same differences in color.

Weight.		Ratio of Fuel to Air.	Highest Possible Temperature.	Appearance of a Body exposed to such Temperature.
Carbon.	Air.			
lbs.	lbs.			
1.	11.6	1 to 1	4347°	Intensely brilliant.
1.	17.4	1 " 1½	2951	Dazzling white.
1.	23.2	1 " 2	2233	Bright ignition.
1.	29.0	1 " 2½	1797	Full cherry red.
1.	34.8	1 " 3	1503	Commencing cherry red.
1.	58.	1 " 5	908	Incipient red.
1.	69.6	1 " 6	758	Black.

5. *Effect of Deficiency of Air.*—If, before reaching the upper layers of carbon or cinder, the air has parted with all its oxygen to form carbonic acid with the production of heat, then the carbonic acid combines with part of the remaining carbon to form Carbonic Oxide, CO (q.v.), but without producing heat. The loss may amount, therefore, to one-half of the F.: some have stated it as high as three-fourths. If this oxide, when it rises above the F., meet with air before cooling, it burns with a pale-blue flame, restoring part of the lost heat; but to what extent has not yet been determined.

6. *Effect of Water Present.*—Passing into vapor, water absorbs both sensible and latent heat, and thus diminishes the temperature. Heating power also is lost, as products of combustion are generally passed into the atmosphere at a high temperature.

HYDROGEN AS FUEL.—1. *Air required.*—Hydrogen combines with the oxygen of the air to form vapor of water, mingled with nitrogen:

Hydrogen,		Products of Combustion.	
Air (34.8)	Oxygen,	1.	Vapor of Water,
	Nitrogen,	8.	Nitrogen,
		26.8	26.8
		35.8	35.8

1 lb. hydrogen therefore requires 34.8 lbs. air, while 1 lb. carbon requires only 11.6 lbs.

2. *Amount of Heat Produced.*—The amount of heat from hydrogen is much greater than from carbon; the caloric from 1 lb. heating 60,840 lbs. water 1° F. Part of this, however, is latent in the water-vapor, and must be deducted in calculating intensity of heat, and also heating effect under all ordinary circumstances. This deduction amounts to 9 lbs. water × 965° latent = 8685°, leaving 52,155° as the effective heating power of 1 lb. hydrogen.

3. *Utmost Temperature or Intensity of Heat.*—This is less than in the case of carbon, from the high specific heat and greater quantity of the products. We have—

Vapor of water,	9.	lbs.	Specific heat,	.8470
Nitrogen,	26.8	"	"	.2754
	35.8	"	Mean sp.	.4191

FUEL.

52,155° on water will be 124,445° on these products; and $\frac{124445}{35.8}$ lbs. = 3476°, is the utmost possible temperature.

4. *Effect of Excess of Air.*—As in the case of carbon, the intensity of heat is diminished, as follows:

Weight.		Ratio of Fuel to Air.	Highest Possible Temperature.
Hydrogen.	Air.		
lbs.	lbs.		
1.	34.8	1 to 1	3476°
1.	69.6	1 " 2	2187
1.	104.4	1 " 3	1591
1.	139.2	1 " 4	1250

5. *Effect of Deficiency of Air.*—No new product is the result of deficiency of air, as in combustion of carbon; the hydrogen simply escapes unconsumed.

6. *Effect of water-vapor present* is diminution of intensity and ultimate loss of heat in application, as in the case of carbon.

Temperature of Ignition of Carbon and Hydrogen—These substances must be themselves heated before they can burn. Hydrogen begins to burn at or below 500°, while carbon requires a red heat (800° to 1,000° F.), and even at that temperature burns very slowly. Consequently, where they are combined, as in common coal, the temperature present is often sufficiently high to ignite and consume the hydrogen, while the carbon remains unchanged as cinder, or passes away as smoke, unconsumed in either case.

All that has been said above, of carbon, as to air required, heating power or value, utmost temperature, temperature of ignition, effect of water present, and of excess or deficiency of air, applies, without modification, to one class of fuels—the purely carbonaceous, including anthracite, coke from coal, charcoal from wood and peat, and the cinder of any description of fuel. The incombustible ash must be allowed for in calculating heating power or value; also the volatile bodies—nitrogen, sulphur, etc.—the latter of which frequently renders the F. unsuitable for many purposes in the arts and manufactures.

Peat, wood, and coal with the exception of anthracite, contain hydrogen to an extent rarely exceeding 5 per cent. We have seen that, compared with carbon, hydrogen requires three times as much air, and generates nearly four times as much heat, but produces 20 per cent. less intensity of heat, and ignites at a much lower temperature; and the combustion of wood, coal, etc., is in these respects modified according to the proportion of hydrogen present in them.

The table on next page shows the composition of British coal (bituminous, known in the United States as soft coal), as determined by Playfair and De la Beche. Columns 8 to 12 are added to illustrate the process of combustion.

When bituminous coal is heated in a retort, it yields volatile Hydrocarbons (q.v.), amounting to 20 to 32 per

FUEL.

Locality.	Average Composition.				
	Car- bon.	Hydrogen.	Water = Hydrogen and Oxygen	Sulphur and Nitrogen.	Incom- bustible Ash.
Wales,	83·78	4·27	4·67	2·41	4·91
Newcastle,	82·12	4·60	6·40	2·59	3·77
Lancashire,	77·90	4·53	10·72	2·74	4·88
Scotland,	78·53	4·40	10·90	2·11	4·03
Derbyshire,	79·68	3·66	11·56	2·42	2·65
	1	2	3	4	5

Locality.	On Distillation, there is						Proportion of Hydrogen to Carbon.
	Left as Coke or Cinder.		Expelled in Gaseous Form.				
			Water, Sulphur, and Nitrogen.	As Volatile Hydrocarbons.			
	Ash.	Carbon.			Hydrogen.	Carbon.	
Wales,	4·91	67·69	6·68	4·27	16·09	20·36	1 to 3 8
Newcastle,	3·77	56·90	8·99	4·60	25·22	29·82	1 " 5·5
Lancashire,	4·88	55·34	13·46	4·53	22·56	26·69	1 " 5 4
Scotland,	4·03	50·19	13·01	4·40	28·34	32·74	1 " 6·4
Derbyshire,	2·65	56·67	13·98	3·66	23·01	26·67	1 " 6·3
	6	7	8	9	10	11	12

cent. of its weight (see column 11). The hydrogen has robbed the F. of six times its own weight of carbon. When fresh F. is added to live coal in a furnace, the same result ensues; so that in using coal, 50 to 67 per cent. of carbon burn on the grate, and 20 to 33 per cent. carbon and hydrogen have to be burned in the open space above the fuel, or escape unconsumed.

The elements of a hydrocarbon are consumed, not simultaneously, but in succession. First, the carbon is separated from the hydrogen in light floating particles, subsequently seen as soot or smoke (if not consumed); then the hydrogen burns, and communicates heat to the carbon particles, which then appear as flame. The color of the flame indicates the temperature present; and if the temperature is sufficiently high, the carbon of which the flame is composed burns also, producing a further increase of heat. If not the flame, as it moves onward, cools, becoming red, dull red, and finally black and smoky, passing away as such. For complete combustion of common coal, we therefore require not only air in sufficient quantity, but also intensity of heat above the fuel. We require a low temperature to separate the carbon from the hydrogen; a higher temperature to consume the hydrogen; and a still higher to consume the carbon of the flame. In closed furnaces, such as those of steam-boilers, while the current of air supplied continues approximately uniform in quantity, the volatile bodies are evolved almost immediately after fuelling; and would require, for the moment, perhaps four times the quantity of air which is passing through. The volatile F.

FUEL.

is, in consequence of the want of air, carried off partly unconsumed; and the temperature in such furnaces is frequently too low for the ignition of carbon, as may be seen from the color of the flame; the cold boiler having abstracted the heat before the flame has been subjected to its influence. See SMOKE, CONSUMPTION OF, for an account of plans adopted to secure perfect combustion, and thus prevent smoke. From the principles involved, we should expect most success where the F. is supplied by mechanical arrangements as regularly and uniformly as the air, and where, in addition, the body of the furnace is protected or removed so far from boiler-surface and other cooling agents as is necessary to maintain a temperature within it sufficient for the thorough ignition of the flame. In open fires in houses, where the heat is lost if not radiated forward into the room, the cinders should be drawn to the front, and the fresh F. (if bituminous coal or wood) laid into the vacant space behind. The gases rise between the two, and being highly heated, form a sheet of flame above and behind the red-hot F. in front. If, as is commonly done, we throw the fresh F. on the top of the live coal, we interrupt the process of radiation, and the gaseous part of the F. is thrown off rapidly into the cool atmosphere above the grate, and does not take fire until a considerable period has elapsed. To ordinary fire utensils, might be added with advantage one of a rake shape, suited for drawing forward the fuel,

For dimensions of furnaces, etc., see STEAM-ENGINE.

Economy of F. will be secured, first, by accomplishing perfect combustion both of the fixed and of the volatile parts of the F.; secondly, by regulating the amount of air, as any excess of air has to be passed on to the chimney at the same high temperature as the true products of combustion.

The abundance or scarcity of F. has a great effect on the general interests of a country and the comfort of its inhabitants. The wealth and prosperity of Britain may be attributed in part to the abundance of coal in those districts both of England and Scotland in which ironstone is most abundant, and in which, therefore, the coal is required as F. for smelting it. But even for the most ordinary uses of domestic economy, the scarcity of F. in some parts of the world causes much hardship. Coal, wood, and peat are the three kinds of F. principally used; coal being indeed the vegetation of former geological periods—the product of their sunshine and their showers, treasured up for the present; peat, a recent formation. Coal may be said in general to be of about twice the value of wood as F. weight for weight, in its heating power. In those parts of the world in which coal is not found, or to which it cannot be easily—or as yet profitably—conveyed, the preservation of forests is of great importance; and trees are frequently planted in some parts of Europe, in hedgerows and otherwise, chiefly for fuel. For the same reason, pollarding is resorted to, the branches being used as F., and the trunk left to produce new branches. Only some kinds of trees are adapted to this mode of treatment. In some regions,

FUENTE ALAMO—FUENTES DE ONORO.

as on some steppes of Asia and other treeless plains, the dried dung of herbivorous animals is much used as fuel. In cases of less extreme necessity, all kinds of vegetable refuse are used. Thus, in many parts of the continent of Europe, things are carefully gathered up for fuel which in this country would probably be burned on the field for mere riddance.

FUENTE ALAMO, *fwēn'tā á'lá-mō*: town of Spain, province of Murcia, 18 m. s. from Murcia, at the n. base of a range of hills, not far from the canal of Murcia. Pop. about 10,000.

FUENTE DE OVEJUNA, *fwēn'tā dā o-vā-čhóná* (Sheep-well): small walled town of Spain, province of Cordova, 44 m. n.w. of the town of Cordova; on the crest and sides of a conical hill, between two of the upper branches of the Guadiata. At the foot of the hill, and on its w. side, are the wells from which the town is named. It has manufactures of linens, woolens, and leather. Coal-seams occur in the vicinity. Pop. (1891) 7,958.

FUENTERRABIA, *fwēn-tā-rá-věá*, or FONTARABIA: city and fortified port of Spain, prov. of Guipuzcoa, on the French frontier, at the mouth of Bidassoa river, 11 m. e. n. e. of San Sebastian, 2 m. from Irun. During the wars between France and Spain it was a place of considerable strategic importance, was strongly fortified, and frequently passed from the possession of one country into that of the other. France made unsuccessful attempts to capture it 1476 and 1503, was successful 1521, and lost it 1524. In 1638 the Prince of Condé was severely repulsed here, 1719 it was taken after a long siege by the English, and 1794 it was recaptured and dismantled by the French. In 1813, Oct., the Duke of Wellington secured a passage into France, despite the watchfulness of Soult's army by means of a ford opp. F., and during the Carlist war (1837) the auxiliary British legion gained here a signal victory over the Carlists. Pop. 3,713.

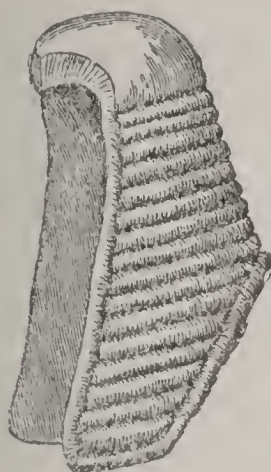
FUENTES DE ONORO, *fwēn'tēs dā ō-nō'rō* (Fountains of Honor): small village of Salamanca, Spain, on the Portuguese frontier, 14 m. w. of Ciudad Rodrigo; scene of one of the important battles of the Peninsular war, between the English under Wellington, and the French under Massena. Wellington, who had resolved to abide battle, drew up his forces between the Coa and the Agueda, his line extending n. and s. about seven miles, and his right wing stretching two m. s. of F. de Onoro. 1811, May 3, this village was fiercely attacked by a strong body of French troops, who forced the English from the streets, and were not dislodged until the English, reinforced by three regiments, drove them by a terrific charge from their position, with a loss in all of 300 men. On the 5th, the battle proper commenced. The French, much stronger than their enemies in both cavalry and infantry, assailed Wellington's right with overwhelming numbers, and though prodigies of valor were performed by the English—as in the case of Ramsey's brigade of horse-



Fulcrum.—L, Lever; F, Fulcrum.



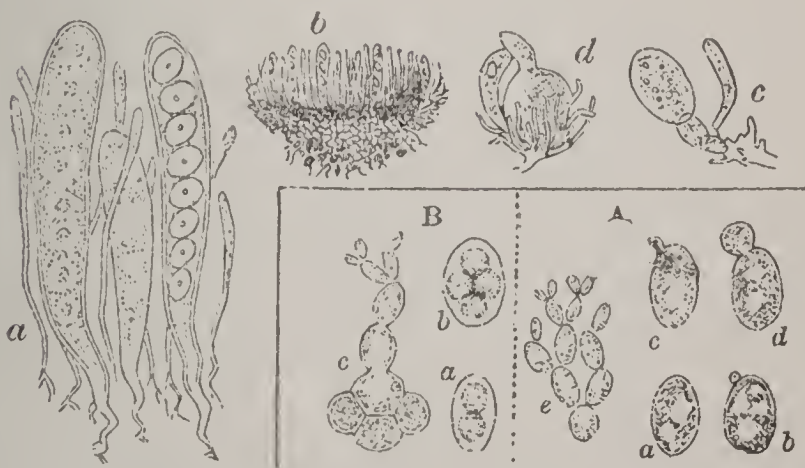
Fucus Nodosa.



Full-bottomed Wig.



Fungi.—1, *Agaricus comatus* (tall cylindrical agaric); 2, *Boletus edulis* (edible boletus); 3, *Morchella esculenta* (round-headed morel).



Fungi.—Fig 1. *Peziza*: a, Asci, with barren filaments (paraphyses); b, Section of fructification surface (hymenium); c, Preparations for the sexual process which precedes the development of the fungus-body; d, Fertilization, with upgrowth of an enveloping tissue, the incipient sporocarp. Fig. 2. Yeast (*Saccharomyces cerevisiae*): A—a, b, c, d, Early stages of budding; e, Later stages. B—Starved yeast cell, dividing at a to form four ascospores at b; c, Subsequent germination on return to nutritive fluid.

artillery, which cut its way through a solid body of cavalry—their right wing was turned, and their position lost. Never during the war were the English forces more perilously situated. Meanwhile, at F. de O., on which Wellington's *left* wing now rested, a fierce battle was being fought. The three English regiments who had been left in occupation made a desperate resistance against assailing multitudes. The fight lasted here till evening, reinforcements having been brought upon both sides; and the night closed upon the English holding the crags above the town, and the retiring regiments of the French. The loss of the allies amounted to 1,500, while that of the French, stated at the time as nearly 5,000, was certainly greater than that of the allies. Neither army could claim a decided advantage in this battle; but its result was, that on the 10th the French were forced across the Portuguese frontier; and thus ended the French invasion of Portugal.

FUERO, *fû-ā-ro* [Sp.—from L. *forum*]: strictly, seat of justice, or jurisdiction; but in this last sense, was transferred to collections of laws, specially to the civic rights by charter or laws granted by Spanish kings to individual cities, the most famous of which were the fuero of Leon and that of Naxera. As these city charters contained for the most part special liberties, concessions, and privileges, the word F. became current chiefly in this sense, and was particularly so applied to designate the body of privileges and liberties that made up the constitution of Navarre, and of the three Basque provinces of Biscaya, Alaya, and Guipuzcoa. These are the fueros the maintenance of which gave rise to wars in the Basque provinces 1833. The fueros of other provinces and cities of Spain have long been extinct.

These Basque fueros were grounded on the old laws of the Visigoths, and grew up in the period between the irruption of the Moors into the Spanish peninsula and the consolidation of the Spanish monarchy under the House of Hapsburg. The same was the case in the half-Basque province of Navarre, which formed an independent kingdom under its own sovereigns. The fueros were thus the joint product of the ancient Gothic laws—those fertile sources of modern rights—and the new circumstances in which those laws came to work. They resulted by degrees, here as elsewhere, in a struggle between the people and the princes; and their development forms an interesting chapter in the history of modern constitutionalism. They were at first only privileges and statutory rights granted to single places, and from these were extended to others. By the introduction of the representative element of the Cortes, and extension over whole provinces, they were then transformed, in virtue of the general law of custom, into constitutional rights of these provinces; and were in time collected and formally embodied and sanctioned as such. It was in this way that the fueros of Navarre, which had been growing into consistency for centuries previously, were, 1236, during the contests between King Theobald and his Cortes, collected and recorded, and re-

FUERTE—FUERTEVENTURA.

main yet under the title of *Cartulario del Rey Tíbaldo*. Ferdinand the Catholic, who united Navarre with the crown of Castile, maintained the *fueros*, adapting them to the new relation to Castile. Their leading provisions were these: The Cortes, chosen for three years, and consisting of the three estates of clergy, nobles, and commons, are to meet yearly; and without their consent, no law can be passed, or anything of importance undertaken. The government consists of the viceroy, who presides in the Cortes and Great Council; the Great Council of Navarre (a body similar to the old French parliaments); and the Contaduría, before which all accounts of revenue and expenditure must be laid. There is no custom-house or toll but at the frontier, and except the trifling grant of 176,000 reals, nothing flows into the royal treasury. All these *fueros* the king had to bind himself by a royal oath to maintain.

In the lordship (*Señorio*) of Biscaya, the *fueros* grew up in the contests of the inhabitants with their counts. They were collected into a code first by Count Juan 1371, which, after the final union of Biscaya with Castile, was recast (1526), completed, and confirmed by King Charles I. (German emperor Charles, V.). According to this charter of rights, every new 'Lord'—for only so do the Biscayans style the king of Spain as their prince—14 years old, must come into the country within a year, and take the oath to uphold the *fueros* in certain places appointed for that purpose. The government consists of a *corregidor*, appointed by the 'Lord,' and two deputies; these, aided by six *regidores*, and forming the *regimiento*, conduct the administration. But the supreme power resides in the General Assembly (*Junta General*), which meets yearly under the tree at Guernica, and regulates all the affairs of the lordship, and appoints the deputies and *regidores*. Justice is administered, in the first instance, by the lieutenants (*Tenentes*) of the *corregidor*; in the second, by the *corregidor* and deputies; and in the third, by the royal court at Valladolid. Other privileges were, that every Biscayan of pure blood was counted noble; that except the post-office there was to be no royal governing board in the province; that Biscayans were not bound to serve in the Spanish army. The *fueros* of Alava and Guipuzcoa were of analogous origin and character, but differing in details. Abolished by Espartero, these *fueros* were restored by Queen Isabella 1844. In 1876 a law abolishing the Basque *fueros* was adopted, and 1877 a decree was passed, assimilating the administration of the Basque provinces to that of Spain.

FUERTE, *fwër'tā*, or VILLA DEL FUERTE, *vël'yá dël fwër'tā*: town of Mexico, 75 m. n. by w. from Sinaloa. It has some commercial importance. Pop. 8,000.

FUERTE DE ANDALGALA, *fwër'tū dā ân-dāl-gá'lá*, or ANDALGALA: town of the Argentine Confederation, 72 m. n. by w. of Catamarca. Pop. 5,500.

FUERTEVENTURA: see CANARIES.

FUGACIOUS—FUGGER.

FUGACIOUS, a. *fū-gā'shūs* [L. *fūgācem*, swift—from *fūgō*, I fly: It. and F. *fugace*]: fleeting; volatile; unstable; in *bot.*, evanescent; falling off early. **FUGA'CIOUSNESS**, n. the quality of flying away. **FUGACITY**, n. *fū-gās'ī-tī*, act of flying away; volatility; uncertainty. **FUGITIVE**, a. *fū'jī-tīv* [F. *fugitif*—from L. *fugitīvus*]: apt to flee away; flying; volatile; escaping readily: N. a running away; a deserter. **FU'GITIVELY**, ad. *-lī*. **FU'GITIVENESS**, n. the state of being fugitive; volatility; instability; uncertainty.—**SYN.** of 'fugitive, a.': fleeting; unstable; uncertain; wandering; eloping; evanescent.

FU'GÆ: see **FUGIE WARRANT: MEDITATIO FUGÆ**.

FUGARO, *fō-gá'rō*: stop, of the flute kind, in some organs; of 4-ft. pitch, sometimes of 8-ft. pitch; of a small scale, made of wood or tin. In tone it is as piercing as the *gamba*, but much clearer.

FUGGER, *fūg'gēr*: one of the most remarkable families in Germany, which, rising by industry and commerce, has founded numerous lines of counts and even princes.

The ancestor of the family was **JOHN F.**, master-weaver in Graben, near Augsburg. His eldest son **JOHN F.**, acquired by marriage, 1370, the freedom of Augsburg, and began a trade in linen, with weaving. By a second marriage, 1382, with the daughter of a councilor, he had two sons and four daughters. This John F. was one of the council of twelve (Ger. *Die Zwölfer*, 'the twelvers') in the weaver guild, and an assessor of the famous Fehmgericht (q.v.) or secret tribunal of Westphalia. He died 1409, and left what was a large fortune for the time—3,000 gulden or florins.

His eldest son, **ANDREW F.**, made such good use of his share of the inheritance that he got the name of 'the Rich Fugger.' By marriage, he founded a noble line, which, however, died out 1585. John's second son, **JACOB F.**, (d. 1469) was superior and 'twelver' of the weaver-guild, and held in high esteem by his fellow-citizens; he was the first of the Fuggers that had a house in Augsburg, and he carried on an extensive commerce.

Of his seven sons, three, Ulrich, George, and Jacob II., by industry, ability, and integrity, extended their business to an extraordinary degree, and laid the foundation for the splendor of the family. They married into the noblest houses, and were raised by the emperor Maximilian to the rank of nobles. The emperor mortgaged to them, for 70,000 gold gulden, the county of Kirchberg and the lordship of Weissenhorn, and received from them afterward, through the mediation of Pope Julius II., 170,000 ducats, to assist in the war against Venice. **ULRICH F.** (1441–1510) applied himself specially to the commerce that he opened with Austria, and there was almost no object that did not enter into his speculations; even the master-pieces of Albert Dürer went through his hands to Italy. **JACOB F.** (1459–1525) engaged in mining; he farmed the mines in Tyrol, and accumulated immense wealth; he lent to the Archduke of Austria 150,000 gulden and built the magnificent castle

FUGGER.

of Fuggerau, in Tyrol. Thus the wealth of the Fuggers accumulated: their wares went to all lands, and scarce a road or sea but bore their wagons or ships.

Under Charles V. the house attained nearly its greatest splendor. Jacob F. having died childless, and the family of Ulrich F. also being extinct, the fortunes and splendor of the house rested on the sons of GEORGE F. (d. 1506). At his death, he left three sons, one of whom, MARCUS F. entered the priesthood; the two younger, RAIMUND F. and ANTONY F. carried on the business, and became founders of the two chief and still flourishing lines of the House of Fugger. The two brothers were zealous Rom. Catholics, and with their wealth supported Eck in his opposition to Luther. During the diet held by Charles V. at Augsburg, 1530, the emperor lived in Antony F.'s splendid house in the Wine Market. On this occasion he raised both brothers to the rank of counts, and invested them with the still mortgaged properties at Kirchberg and Weissenhorn; and a letter under the imperial seal conferred on them the rights of princes. For the support that they afforded him in his expedition against Algiers 1535, they received the right of coining money. Antony F., at his death left six million gold crowns in ready money, besides jewels and possessions in all parts of Europe and in both Indies. It is of him that Emperor Charles is said to have remarked while being shown the royal treasury in Paris: 'There is a linen-weaver in Augsburg that could pay all that out of his own purse.'

Emperor Ferdinand II. raised the splendor of the House of F. still higher while confirming the imperial letter of Charles, by conferring great additional privileges on the two oldest of the family, Counts JOHN F. and JEROME F. The Fuggers continued still as nobles to carry on their commerce, and further increased their immense wealth. They attained the highest posts in the empire, and several princely houses prided themselves on their alliance with the House of Fugger. They possessed the most extensive libraries and collections of objects of art, maintained painters and musicians, and liberally encouraged art and science. Their houses and gardens were master-pieces of the architecture and taste of the times. There is thus nothing incredible in the story that Antony F., on one occasion when Charles V. was his visitor, lighted a fire of cinnamon wood with the emperor's bond for money lent him. While thus indulging in splendor, they were not backward in doing good. Ulrich, George and Jacob, sons of the beneficent JACOB F., bought houses in one of the suburbs of Augsburg, pulled them down, and built 108 smaller houses, which they let to poor citizens at a low rent. This was the origin of the 'Fuggerei,' which remains under the same name, with its own walls and gates. Many other benevolent institutions were established by Antony F. and his sons. It is questionable if we are to rank among their benefactions their calling the Jesuits to Augsburg, and giving them buildings and revenues for a college, church and school.—The race is continued in the two principal lines of

FUGIE WARRANT—FUGITIVE SLAVE LAW.

Raimund and Antony, besides collateral branches. The domains are chiefly in Bavaria. A collection of portraits of the most important members of this great house, executed by Domin. Custus of Antwerp, appeared in Augsburg (1593 et seq.). This collection (increased to 127, with genealogies in Latin) was republished by the brothers Kilian (Augsburg 1618); and 1754, a new ed. of the work, further improved, containing 139 portraits, was published at Ulm, under the title *Pinacotheca Fuggerorum*.

FUGIE WARRANT, *fū'jī wōr'ānt* [L. *fūgĭō*, I flee or run away]: in *Scots law*, a warrant issued for the apprehension of a debtor who, according to sworn evidence, is about to abscond—or *in mēditātīōnē fūgæ*, in the contemplation of flight: see MEDITATIO FUGÆ.

FUGITATION, *fū-jī-tā'shūn*, SENTENCE OF, in *Scots Law*: correspondent to outlawry in a criminal process. It is pronounced where a person fails to appear to answer to a criminal prosecution against him. Among other consequences, it entails the escheat of his whole movable property to the crown: see ESCHEAT.

FUGITIVE SLAVE LAW: former legal provision, under the constitution of the United States, for rendition of slaves escaping from their masters into other states whether slave states or free states. Slaves being regarded as property, things and not persons, as the Roman law puts it, the existence in every state in which slavery exists of a law recognizing the right of the master to reclaim his property follows as a logical consequence. Accordingly, the U. S. constitution, having recognized slavery, contained a number of enactments for its enforcement. By art. 4, s. 2 of that document, it was declared that persons held to service or labor in one state, under the laws thereof, and escaping into another, should be delivered up, on claim of the party to whom such service or labor might be due. Previous enactments were to a large extent superseded by the law of 1850, Sep. 18, imposing judicial duties, in arrest and return of fugitive slaves, on the U. S. commissioners, who might have the power of arresting or imprisoning for offenses against the United States; on the judges of the U. S. circuit and district courts, and of the superior courts of territories; and on such special commissioners as the respective courts might appoint. It was the duty of all U. S. marshals to obey and execute all warrants and process of such judges and commissioners; and after the arrest of any fugitives, such officers were liable for an escape with or without their assent. When any fugitive escaped into another state or territory, the owner, or his duly authorized agent, might pursue and personally arrest said fugitive, or might demand a warrant and arrest from the officer having due authority. The fugitive was then to be taken before a commissioner or judge, whose duty it was to hear and determine the complaint in a summary manner. If satisfied of the validity of the claim and the identity of the slave, he had it for his duty to deliver to the claimant a certificate of the proceeding had, with author-

ity to remove the fugitive to the place from which he had fled. The testimony of the fugitive was not admissible. Any assistance rendered to a fugitive to enable him to escape from the claimant, or any obstruction offered to his arrest, was penal, and also subjected the party to damages at the suit of the owner. All citizens of the United States were required, when called upon, to render the officers personal assistance in the performance of their duties. These provisions applied to all the states previously to the war, whether slavery was recognized by their special laws or not; the principal being that 'the constitution and laws of the United States secure the right to reclaim fugitive slaves against state legislation.' In some of the slave-holding states it was held, that if a slave from such a state went lawfully with his master into a non-slave-holding state, and acquired a domicile there with his master, or was emancipated there, he became emancipated, and ceased to be a slave if he should return; but if he were carried there for a temporary purpose, and returned, his state of slavery was resumed. These provisions did not apply to the fugitive slave (Kent. *ut sup.* ii. p. 297).

This law, which had become increasingly odious to the people of the northern states, was swept away by the storm of civil war which changed the constitution and abolished slavery throughout the land. Pres. Lincoln's Emancipation Proclamation, 1863, Jan. 1, was followed by the adoption of Articles XIII and XIV of the Amendments to the Constitution, and by the abolition of slavery by each of the former slave-states. See CONSTITUTION: SLAVERY.

FUGLEMAN, n. *fū'gl-măn*, properly FLUGELMAN [Ger. *flügelmann*—from *flügel*, a wing; *mann*, a man]: an intelligent soldier posted in front of a line of men at drill, to give the time and an example of the motions in the manual and platoon exercises. He originally stood in front of the right wing; hence the name.

FUGUE, n. *fūg* [F. *fugue*—from L. *fūgă*, a flight or chase: It. *fuga*], in *music*, a piece in which the parts follow or chase each other with certain repetitions at intervals. FUGUIST, or FUGIST, n. *fū'gĭst*, one who composes or performs fugues. FUGA, a. *fū'ga*, a fugue. FUGAL, a. *fū'gal*, pertaining to or of the nature of a fugue. FUGATO, ad. *fū-gá'tō*, in the fugue style, but not in strict fugue form.—In a *Fugue*, each part successively takes up the subject or melody. Any of the parts may begin the fugue, but the others follow according to fixed rules. The subject is generally a few bars of melody, given out in the principal key by the part which begins. The next part which enters repeats the same melody, but a fifth higher or a fourth lower, and is called the answer. The third part follows with the subject again in the principal key, but an octave higher or lower than the first part, and is answered by the fourth part in the same manner as the second part answers the first. After the subject is completed, the melody which follows it, to form a continuation of the part, is called the counterpoint, in the construction of which,

FUGUE.

facilities for ingenious double counterpoints of various kinds are afforded. When the subject and answer have been introduced in all the parts, the first section of the fugue is said to be completed; an intermediate harmony of a few bars then follows, sometimes in its form like part of the subject, and with a modulation into a nearly related key. The subject and answer are again brought forward, but following in a different order from the first section; while all the parts are continued, and in some of them the original counterpoint appears either simply or inverted, the subject and answer forming the predominating idea throughout the whole composition, and toward the end appearing in a variety of forms, intervals, and modifications. When the subject does not extend its compass beyond half an octave, the answer is invariably made in the other half; and to avoid modulation out of the key, the progression of a fifth is answered by a fourth. A fugue consisting of one subject with a counterpoint throughout, is called a strict fugue, as in the following example by J. Sebastian Bach, in which the first progression of a fifth is answered by a fourth:

Subject.

Answer.

When a second subject is introduced in the middle of the composition, and afterward worked up with the first subject, the fugue is called a fugue on two subjects, as in the following from Graun's *Tod Jesu*:

1st Subject.

Christus hat uns ein Vor-bild ge-las

2d Subject.

auf dass wir sol . . . len nach-fol . . . een sei-nen Fuss . . ta

Both subjects united.

FUH-CHOW—FUH HE.

A double fugue begins at once with two subjects in different parts, both of which are strictly treated throughout, as in the following from Mozart's *Requiem*:

2d Subject.

A free fugue is that in which the subject and counter point are not strictly treated throughout, but mixed with intermediate harmonies and ideas not connected with the subject, while the rules of the fugue are not rigidly adhered to.

The fugue has always been, and will continue to be, esteemed by every sound musician, not from its being the most difficult style of composition, but from its not being subject to caprice and fashion. The fugues of Bach, Handel, and other composers possess the same interest for the present time as they have done for generations past. Although the fugue is held by many to be a mere mechanical study, which can be composed or written purely by rule and calculation, and has probably been overworked in ordinary church-music, still, it undoubtedly offers to a composer of genius a wide field for great and beautiful effects as well as peculiar artistic combinations. The best works on the fugue are by Marpurg, Albrechtsberger, Kirnberger, and the late Prof. S. W. Dehn of Berlin.

FUH-CHOW: see FU-CHOW-Foo.

FUH-HE, or FUH-HE-SHE: first of the five emperors of China in the mythological period. If such a person existed, his era would be abt. B.C. 3,000. He is said to have reigned 115 years. Before the time of Confucius, ten epochs including more than 2,267,000 years are assigned by Chinese writers, as having elapsed since man appeared. Probably the first glimmer of Chinese history dates at the time of this king. He is said to have instructed the people in the art of rearing cattle, and invented the *pà-kwá*, or eight combinations of four strokes, to express the changes of nature. His chief invention, however, seems to have been that of letters, by drawing up the two linear tables called Ho-too and Lo-shoo, which, according to the legend, he copied from the back of a dragon rising from the deep. According to another account, knotted cords, 20 inches long, were used for writing, till Tsang-ke, the minister of F., conceived the idea of characters from seeing the foot-prints of birds on the sands. F. (in the legend) instituted marriage, invented the musical instrument called *kin*, and taught the art of fishing. It is clear that he personifies a condition of society. The legend gives him a head with projections like the horns of an ox, and the body of a dragon.—See CHINA: also San-tsze-king, l. 21, 22; Kang-keen-e-che-luh, i. p. 6; Gutzlaff. Boulger (1381), Douglas (1882). on Chinese histor^y

FUH-KEEN—FÜHRICH.

FUH-KEEN, or FU-KIAN, or FO-KIEN (Happy Established or the Consummation of Happiness): one of the eastern maritime provinces of China; s. of Che-keang, between the parallels $23^{\circ} 35'$ and $28^{\circ} 47'$, and backed by the great southern range of mountains that separates s.e. China from the inland provinces. F. belongs to the hilly portion of China proper. It is a black-tea district, and produces barley, wheat, rice, tobacco, yams, and other Chinese vegetables. The principal fruits are the orange, li-chee, olive, plum, pomello (sub-acid fruit, somewhat like an orange), plantain, and mulberry. On its coasts are the ports of Fu-chow (q.v.) and Amoy, or Hia-mum (gate or harbor of Hia), opened by the treaty of Nankin, 1842, Aug. 29. See CHINA. The island of Formosa and the Pang-hoo group were included in this group till 1884, when Formosa was made an independent (19th) province under a governor. Area, 38,502 sq. m. Pop. est. 25,790,000

FÜHNEN, *fü'nën* (Dan., *Fyen*): largest of the Danish islands after Seeland; bounded w. by the Little Belt which separates it from Jutland and Slesvig; n. by the Odensee Fjord; e. by the Great Belt; and s. by the Little Belt, and by the small island of Langeland which is incorporated with it in one circle, or *stift*, of the kingdom; area of this stift, 1,302 sq. m; pop. (1880) 246,454.—The coast is generally rugged, and much indented with bays or fjords; but the interior is flat, except toward the s. and w. where there is a range of hills rising to about 500 ft. The land, well watered by several small streams, is fruitful and well cultivated, producing abundant crops of cereals. Barley, oats, buckwheat, rye, flax, and hemp are grown in larger quantities than are required for home consumption. Honey also is largely exported. The F. horses are in great request, and large numbers of them, and of a fine breed of horned cattle, are annually sent out of the island. The province of F. is divided into the two bailiwicks of Odensee and Svendborg. The principal towns are Odensee (q.v.), Svendborg (q.v.), and Nyborg—pop. (1880) 7,184—a fortified town on the e. coast, and the most direct port of communication with Seeland, and memorable as the seat of the annual Danehof, or meeting of the States, instituted 1354 by Valdemar IV., and for the victory gained 1659 by the Danes and their allies over the Swedes.

FÜHRICH, *fü'rîch*, JOSEPH VON: 1800, Feb. 9—1876, Mar. 13; b. Kratzau, Bohemia: painter. He settled in Vienna 1834; was the same year appointed custos, and 1841 prof. of composition and historical painting in the Imperial Acad. of Fine Arts; exhibited in the Paris exhibitions of 1855, 67; and was pensioned and appointed a knight of the order of Franz Joseph 1872. His paintings include the decoration of the villa Massimi; many scenes in the history of Bohemia; four grand cartoons representing the *Road to the Cross* in the church of St. Jean Népomucène, Vienna; a *Pater Noster*; *History of St. Genevieve*; *The Triumph of Christ*; *The Glorification of Christ*; *St. Paul at Areopagus and Athens*; *The Confirmation at Samaria*; *St. Peter Preaching*.

FUIRENA—FULAHS.

FUIRENA, n. *fū-ř-rě'na* [named after G. *Fuiren*, Danish botanist]: typical genus of *Fuireneæ*, tribe of sedges (*Cyperaceæ*).

FUL, postfix, *fúl* [from **FULL** 1]: a postfix denoting that the thing holds all it can contain. **PAILFUL**, n. a pail which can contain no more. **PAILFULS**, n. plu. the contents of a pail measured to its utmost capacity and repeated again and again. **PAILSFULL**, two or more each completely filled: so *mouthful*, as much as the mouth will contain; *mouthfuls*, the same mouth filled again and again; *mouths full*, the mouths of two or more persons filled.

FULAHS, *fó-láz* [properly, *Fúlbe* (sing. *Púllo*)], or **FÉL LANI** (sing. *Baféllanchi*), or **FELLÁTA**, or **FULLÁN**: name of a widely-spread negro people in Upper Súdán, regarding whose origin there is much diversity of opinion. Keane makes them, with the Nubas, the third of the seven distinct groups of African races (see **AFRICA**). Eichwaldt connected them with the Malays, but Barth says that 'none of his arguments are of any consequence.' Yet Dr. Barth is of opinion that 'their origin is to be sought for in the direction of the East; but this,' he adds, 'refers to an age which for us is enveloped in impenetrable darkness.' The F. emerge into the light of history first about the beginning of the 14th c., when, as we learn from Ahmed Bábá's *History of Súdán*, two members of the tribe went on a religious mission from Melle, on the borders of Senegambia, to the king of Bórnu. The importance of this incident is in the fact, that it shows that in the dawn of their history—as has invariably been in later times—the course of the tribe was from *west to east*; also, that at the early period referred to, they were distinguished for that religious learning which still characterizes them. After the 14th c., successive swarms of F. appear to have left the kingdom of Melle, or the mountainous region of Fuládu, and to have spread themselves over the greater portion of Súdán, 'absorbing and incorporating with themselves different and quite distinct national elements, which have given to their community a rather varying and undecided character.' Hence originate the conflicting accounts of travellers, some of whom speak of the F. as differing little from the negroes; others, as having features and skulls of the European mold; while Bowen describes those of Yoruba as being some black, some almost white, and many of a mulatto color, varying from dark to very light. Many other tribes, not quite absorbed by the F. are yet so far blended with them, that they have lost their native idiom altogether, and speak the language of the predominant race, which is termed the Fulfulde. The F. are not all under one ruler; they are a *race*, not a *nation*; and have founded many kingdoms, such as those of Sókoto, Gando, Timbo, etc. The numberless tribes belonging to their stock are generally divided into four groups or families, the Jel, the B'aá, the Só, and the Berí. Most of them became converted to Mohammedanism about the middle of the 18th c., and in 1802, under the Imám Othman, commenced a religious war on the surrounding pagans, which terminated prosperously in the establishment of the great Fulah empire of

FULCRUM—FULDA MANUSCRIPT.

Sókoto. Othman died in a sort of fanatical ecstasy or madness 1818. The F. are industrious and inclined to trade; they work iron and silver, manufacture with great neatness articles in wood and leather, and weave various durable fabrics. They are by far the most intelligent of the inhabitants of Súdán, and have, besides mosques, schools in almost all their towns.

FULCRUM, n. *fŭl'krŭm*, FUL'CRA, or FUL'CRUMS, n. plu. [L. *fulcrum*, a prop—from *fulcĭrĕ*, to keep upright]: in *mechanics*, a prop or support; fixed point at which any lever is sustained (see LEVER). In *bot.*, a general name for several of the appendages of the stem or leaves, which serve for support or defense. FULCRAR, a. *fŭl krár*, of or pertaining to fulcra.

FULDA, *fŭl'dá*: town of Germany, in the Prussian province of Hesse-Nassau, 54 m. s. of Cassel; pleasantly situated on a rising-ground on the right bank of the Fulda, a considerable stream, which, rising from the w. base of the Rhöugebirge, in Bavaria, flows n. through Hesse-Cassel, and unites with the Werra on the Hanoverian border, after a course of 110 m. F. is a pretty town, surrounded by old walls, and has a market-place, two squares, and eight suburbs. One of the chief buildings is the cathedral, the fourth church that has been built on this site. It is a handsome modern structure, and covers the shrine in which the body of St. Bonifacius was deposited after his murder by the Frisians 754. The other notable structures are the palace, formerly the residence of the prince-bishops of F.; the church of St. Michael, founded 822; a gymnasium, schools of art and manufactures, and a public library.—The Monastery of F., founded 744, by Boniface, the 'apostle of Germany,' was long a most notable institution; a school of instruction and civilization in its earlier periods, and later a centre of mediæval theological learning. It was looked to by Alcuin for help in founding universities on the continent of Europe, and became the source of many missionary monasteries. In 968 its primate was made primate of all the abbeys of Germany. As its wealth and power increased, it became corrupt; but attempts at reform were not lacking. In the 16th c., many of its monks seemed ready to welcome the reformation by Luther, but after a few years the authorities completely suppressed all evangelical tendencies.—The modern town has reputation for its linen manufactures; it has also extensive establishments for manufacture of vinegar and beer; with dye-works, tanneries, and weaving. Pop. (1880) 11,507, mostly Rom. Catholics; (1890) 13,125.

The *district* of which F. is cap. forms part of what was formerly the grand-duchy of Fulda: this territory was incorporated with the grand-duchy of Frankfurt by Napoleon 1810, and ceded to Prussia 1815, but immediately afterward was made over to Hesse-Cassel (q.v.)

FULDA MANUSCRIPT, *fŭl'da*: written copy of the Latin version of the New Test. prepared by command of Bp. Victor of Capua 546, and since carefully guarded in the famous abbey of Fulda (q.v.), in Hesse-Cassel, Germany,

It. is complete in all its parts, shows an effort to arrange the gospels in sequence of time, and was collated by Karl Lachmann, D.D., LL.D. (1793-1851), who made it the work of his life to prepare critical editions of the New Test. and the classics.

FULFIL, or FULFILL, v. *fûl'fîl'* [from *full*, and *fill*]: to complete or carry into effect; to perform what is promised, expected, or foretold; to bring to pass; to answer, as a purpose or design. FULFIL'LING, imp.: N. accomplishment; completion. FULFILLED', pp. *-fîld'*. FULFIL'MENT, n. or FULFILLMENT, completion; performance.—SYN. of 'fulfil': to accomplish; effectuate; realize; discharge.

FULGENT, a. *fûl'jěnt* [L. *fulgens* or *fulgen'tem*, shining: It. *fulgente*]: shining; dazzling; exquisitely bright. FUL'GENCY, n. *-sî*, splendor; glitter.

FULGENTIUS, *fûl'jěn'shē-ŭs*, FABIVS CLAVDIVS GORDIANVS, SAINT: 468-533; b. Telepte, Africa: bp. of Ruspe, Numidia. While a youth he became dissatisfied with worldly life, spent several years in monasteries in Byzacena and Sicea, visited Rome 500, and returning to Africa built a monastery and became so distinguished for learning and piety that he was appointed bp. of Ruspe 504. He was one of the ablest promoters of Catholic Christianity, explained 'the system of Augustine with consistency, but carefully avoided the harsh points of the Predestinarian view' (Neander), but 'held in this very work that all unbaptized children, even such as die in the womb are consigned to damnation' (Wiggers). He was twice banished to Sardinia in consequence of difficulties with the Aryans, but was recalled and held his see from 523 till death. The Rom. Cath. Church commemorates him Jan. 1.

FUL'GORA: See LANTERN-FLY.

FULGURATE, v. *fûl'gû-rât* [L. *fulgûr*, a flash of lightning; *fulgûrârē*, to flash, to lighten—from *fulgēō*, I gleam: It. *fulgore*]: to emit flashes of light. FUL'GURATING, imp. FUL'GURATED, pp. FUL'GURA'TION, n. *-râ'shŭn*, the brightening of melted gold or silver. FULGURITES, n. plu. *fûl'gû-rîts*, or FULMINARY TUBES, vitrified sand-tubes supposed to have originated from the action of the thunderbolt or lightning; found in sandbanks, and in soils consisting chiefly of silicious sand. They were discovered 1711 by pastor Herman, at Massel, in Silesia, and have since been found in many places; but their origin was pointed out first by Dr. Hentzen 1805. They are from a quarter of an inch to two inches and a half in diameter, their internal surface of a perfectly glassy substance, hard enough to scratch glass, and to give fire with steel. They are usually but not always, placed vertically in the sand, become narrower downward, and sometimes divide and subdivide into branches.—The term is applied also to the effects of lightning which seem to be exhibited in some places on rocks by vitrification and the production of a sort of enamel, sometimes assuming the form of beads.

FULHAM, or FULLAM, n. *fûl'ăm* [said to be from *Fulham*, a district of London once notorious for blacklegs]: in *OE.*, loaded dice: false dice.

FULHAM—FULLER.

FULHAM, *fûl'am*: formerly a village, now a suburb of London, in the south of Middlesex, on the left bank of the Thames, six m. s. w. of St. Paul's. Here is the palace of the bishops of London.

FU'LICA: see **Coor**.

FULIGINOUS, a. *fû-lîj'î-nûs* [mid. L. *fuliginosus*, sooty—from L. *fûligō*, soot: It. *fuligine*]: sooty; smoky; smoke-colored.

FULIG'ULA: see **POCHARD**.

FULIMART: a spelling of **FOUMART**, which see.

FULL, a. *fûl* [Icel. *fullr*; Sw. *full*; Ger. *voll*; L. *plenus*, full; Ger. *fûllen*, to pour liquids]: well supplied; holding all that can be contained; stored; stuffed; sated; complete: clear; distinct; mature; placed before certain words to strengthen their signification, as, *full* many a flower; perfect or complete, as a *full* moon: N. state of being satiated, as fed to the *full*; complete measure; highest state or degree; the whole or total: ADJ. without abatement; with the whole effect; completely; exactly, as *full* in the face. **FUL'LY**, ad. *-lî*, completely; entirely; perfectly. **FULL'NESS**, n. state of being filled so as to leave no part vacant; completeness, plenty; extent; loudness. **FULL AGED**, of mature age. **FULL-BLOWN**, fully expanded, as a blossom. **FULL-BODIED**, having a large body; having standard strength and flavor. **FULL-BOTTOMED**, having a large bottom, as a wig. **FULL-BUTT**, with strong force or violence. **FULL-CRY**, said of the hounds that, having caught scent of the fox, cry or bark in concert. **FULL-DRESS**, n. the dress which custom or etiquette prescribes for any occasion of ceremony, social or public: ADJ. having all the necessary parts of attire for the occasion. **FULL-DRESSED**, dressed in proper form or costume, as for a ball or concert. **FULD-DRIVE**, with full speed. **FULL-EYED**, prominent. **FULL FACED**, having a broad fat face; presenting the whole face as a portrait. **FULL HABIT OF BODY**, stout and fat. **FULL-HEARTED**, courageous. **FULL-LENGTH**, extending the whole length; embracing the whole. **FULLY-MANNED**, completely furnished with men. **FULL PAY**, the whole pay, without any deductions. **AT THE FULL**, fully brought out or expanded, as the moon.—**SYN.** of 'fully': largely; copiously; plentifully; maturely; plentifully; abundantly; sufficiently; amply; clearly; distinctly; adequately; satisfactorily.

FULL, v. *fûl* [OF. *fouller*, to full or thicken cloth in a mill; F. *fouler*, to tread or trample on—from mid. L. *fûl-lârē*, to cleanse clothes—from L. *fullo*, a dresser of cloth: It. *follare*, to full cloths]: to scour or cleanse; to make compact, or to thicken in a mill; in *OE.*, to whiten cloth; to bleach. **FUL'LING**, imp.: N. the art of thickening and scouring cloth in a mill. **FULLED**, pp. *fûld*: ADJ. cleansed; thickened. **FUL'LER**, n. one whose business is fulling; in *OE.*, a bleacher; one who cleanses clothes. **FULLER'S EARTH** (see below). **FULLER'S THISTLE**, the plant teasel, whose burs are used in dressing cloth.

FULLAM: see **FULHAM**.

FULLER, *fûl'ér*, **ANDREW**: English Baptist minister,

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and theological and controversial writer: 1754, Feb. 6—1815, May 7; b. Wicken, Cambridgeshire; son of a small farmer. He received the rudiments of education at the free school of Soham, and in youth was busied in agricultural labors. In his 17th year, he became a member of a Bapt. church at Soham, and 1775 was chosen pastor of a congregation at that place. His small stipend of £21 per annum he endeavored to increase by keeping, first a small shop, and then a school. In 1782, he became pastor at Kettering, Northamptonshire. On the formation, 1792, of the Bapt. Missionary Soc. by Dr. Carey, himself, and 11 other ministers, he was appointed its sec., and thereafter was devoted to the administration of its affairs. In 1794 he published a controversial treatise, entitled *The Calvinistic and Socinian Systems, examined and compared as to their Moral Tendency* (Lond. 8vo.). This work was attacked by Dr. Toulmin and Mr. Kentish; and F. replied in a pamphlet, entitled *Socinianism Indefensible* (Lond. 1797, 8vo). His other principal publications are *The Gospel its own Witness* (Clipstone 1797), and *Expository Discourse on the Book of Genesis* (2 vols 8vo, Lond. 1806). He was author of a variety of single sermons and pamphlets. The sense, sagacity, and thoroughly practical knowledge of mankind which these writings display, have won for F. the title of 'the Franklin of Theology.' Three collected editions of his works have been published, besides American reprints; the first in 10 vols. 8vo, the second in 5, and the third in 1 royal 8vo. A vol. of his treatises was republished in Bohn's Standard Library, with a Memoir by his son. F.'s *Memoir of the Rev. Samuel Pearce of Birmingham* is much esteemed as a religious biography.

FULLER, JOHN WALLACE: soldier: b. Cambridge, England, 1827, July 28. He removed to the United States 1833; was a bookseller in Utica, N. Y., and Toledo, O.; was treas. of Utica 1852-54; became asst.adj.gen. of O. 1861, May, and col. of the 27th O. vols. Aug.; promoted brig.gen. 1864, brevetted maj.gen. 1865, Mar. 13, and resigned Aug. 15. During his military career he commanded the O. brigade at Iuka and Corinth, captured Decatur, Ala., commanded a brigade in Sherman's Atlanta campaign, and opened the battle of Atlanta, and commanded the 1st div. 17th corps on the march to the sea. He was afterward collector of the port of Toledo. He d. 1891, Mar. 12.

FULLER, MELVILLE WESTON: lawyer: b. Augusta, Me., 1833, Feb. 11. He graduated at Bowdoin College 1853, studied law in Bangor and in the law dept. of Harvard Univ., and was admitted to the bar and began practicing in Augusta 1855, in the following year he became pres. of the common council and city solicitor of Augusta, but resigned both offices and removed to Chicago. He took an active part in the presidential campaign of 1856, supporting the democratic candidate. In 1860 he delivered the address of welcome to Stephen A. Douglas to Michigan City, 1861 was chosen delegate to the Ill. constitutional convention where he rendered good service, 1862 was elected member of the legislature from the 61st dist., usually a

FULLER.

republican stronghold, and 1864, 72, 76, 80 was delegate to the democratic national convention. Aside from these offices he has applied himself closely to his profession, in which he has eminently successful and in which he has never been connected with a criminal case. He was nominated by Pres. Cleveland to succeed the late Morrison R. Waite as chief justice of the U. S. supreme court, 1888, Apr. 30, was confirmed by the senate July 20 by a vote of 40 to 21, and took his seat Oct. 8. He is a member of the Prot. Epis. Church, has been twice married, and has eight children.

FULLER, SARAH MARGARET, Marchioness OSSOLI: 1810, May 23—1850, July 16; b. Cambridgeport, Mass. dau. of Timothy F. an advocate, who gave his daughter an excellent education, and nurtured her with great care. At eight years of age she wrote Latin verses: and philosophy, history, and æsthetics were her favorite studies. At ten she read Tasso and Ariosto in the original, and subsequently made herself familiar with the German writers, Tieck, Schelling, and Novalis. After her father's death she assisted her family by private teaching, and 1839 she founded a society for ladies, where she delivered lectures. 1839-44, she edited *The Dial*, contributing many admirable articles. Invited by Horace Greeley, editor of the *Tribune*, she went to New York 1844, and contributed to that journal a series of articles on literature and art, since published under the title *Papers on Literature and Art* (London 1846). In 1850, she published *Woman in the Nineteenth Century*, in which she discussed the nature and destiny of woman, and claimed for the sex rights long denied. In 1846, she went to England, where she made the acquaintance of Carlyle, for whom she had long had high esteem. At Paris she gained the friendship of Madame Dudevant, better known by her pseudonym of *Georges Sand*. In Rome she met the Marquis d'Ossoli, to whom she was married 1847, Dec. She took an active share in the political questions that agitated those times. In 1849, during the siege of Rome, she took charge of a hospital; and saw with pain the downfall of the new and ephemeral Roman Republic. In 1850, on her return voyage to America accompanied by her husband and newly-born infant, the ship, which had almost reached New York, was wrecked in a hurricane and the three perished in the waves. Her memoirs were published by Emerson and Channing (1852). See also the shorter life by Julia W. Howe (1883).

FULLER, THOMAS, D.D.: English historian and divine: 1608-1661, Aug. 16; b. Aldwinkle, Northamptonshire, of which parish his father was rector. He was educated at Queen's College, Cambridge, and took the degree A.B. 1624, and A.M. 1628. He stood so high in his college that, before he was 23 years of age, he was appointed to St. Benets, Cambridge, and acquired great popularity as a preacher. Soon afterward he was collated to a prebend in Salisbury Cathedral, and obtained a fellowship in Sidney Sussex College. His first publication was a poem, entitled *David's Heinous Sin, Hearty Repentance, and Heavy Punish-*

FULLER'S EARTH.

ments (1631, 8vo). He became rector of Broad Windsor, Dorsetshire; published his *History of the Holy War*, Cambridge 1639; and 1640 removed to London, where he was chosen lecturer at the Savoy Church in the Strand. The same year he was a member of the Convocation at Westminster, and one of the select committee appointed to draw up new canons for the better government of the church. During the civil war adhered firmly to the royal cause; and shared in its reverses. In 1646, however, he was chosen lecturer, first, at St. Clement's Lane, Lombard Street, and afterward at St. Bride's. About 1648, he was presented to the living of Waltham, Essex. In 1650, he published a geographical account of the Holy Land, entitled *A Pisgah Sight of Palestine and the Confines thereof* (folio, with maps and views), and *Abel Redivivus*, a collection of lives of modern divines; 1655, he published at London *The Church History of Britain, from the Birth of Jesus Christ until the year 1648* (folio). In 1658, he received the living of Cranford, Middlesex, and at the Restoration he was reinstated in his prebend of Salisbury, of which he had been deprived by the Parliamentarians. He was also appointed chaplain extraordinary to the king, and created D.D. at Cambridge by royal mandamus. His principal work was *The Worthies of England*, London 1662 (folio). Valuable for information on provincial history, it abounds in biographical anecdote, witty remark, and acute observation on men and manners. A new ed. with his life appeared 1810 (2 vols. 4to). His *Holy and Profane States* were republished in the U. S. 1831. Quaint humor is one of F.'s peculiar characteristics; but his writings are no less remarkable for wisdom, imagination, and, when occasion demands, even for pathos. 'Next to Shakspeare,' says Coleridge, 'I am not certain whether Thomas Fuller, beyond all other writers, does not excite in me the sense and emulation of the marvellous. . . . He was incomparably the most sensible, the least prejudiced great man; in an age that boasted of a galaxy of great men.'

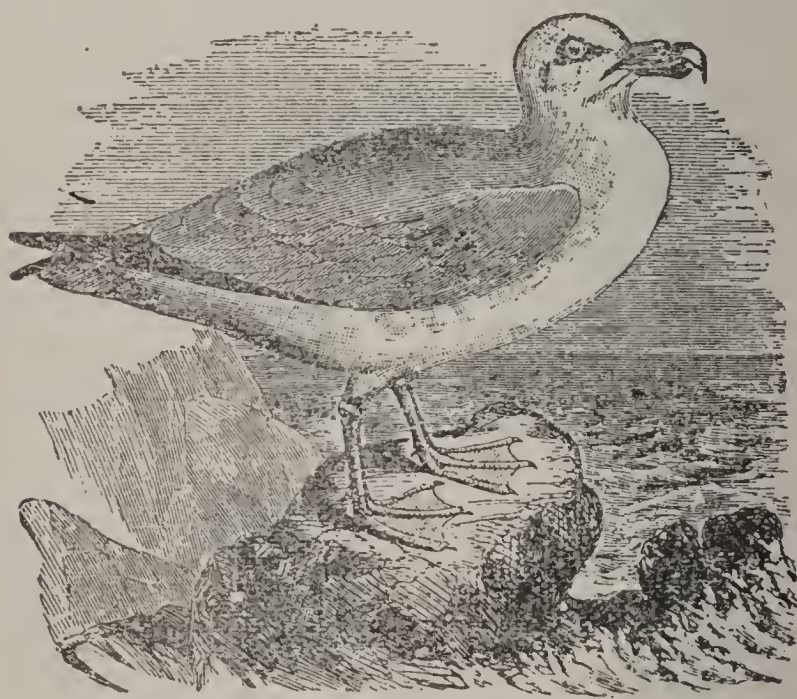
FULLER'S EARTH: mineral consisting chiefly of silica, alumina, and water, with a little magnesia, lime, and peroxide of iron. The silica is about 50, the alumina 20, and the water 24 per cent. of the whole. It is regarded as essentially a hydrous bisilicate of alumina. It occurs in beds, associated with chalk, oolite, etc.; is usually of a greenish-brown or a slate-blue color, sometimes white; has an uneven earthy fracture, and a dull appearance; its specific gravity is from 1.8 to 2.2; it is soft enough to yield readily to the nail; is very greasy to the touch; scarcely adheres to the tongue; falls to pieces in water, but does not become plastic. It has a remarkable power of absorbing oil or grease; and was formerly much used for fulling cloth (see WOOLEN MANUFACTURE), for which it was considered so valuable, that the exportation of it from England was prohibited under severe penalties. Its annual consumption in England at one time was estimated at 6,000 tons: it is still used to a considerable extent. It is found at Nutfield, near Reigate, in Surrey, England, in cretaceous strata; where there are two distinct beds, the upper one of greenish color, 5 ft. thick, resting on the other, which has a bluish tint, and

FULLS—FULMAR.

is 11 ft. thick: there are deposits elsewhere, and at Bath the group of associated blue and yellow clays and marl has received the name of 'the Fuller's Earth Series.' It is found in various countries.

FULLS: see under MATTIES.

FULMAR, n. *fúl'mâr* [Icel. *fúlmar*], or FUL'MAR PET'REL (*Procellaria* or *Fulmarus*): genus of birds generally referred to the gull family (*Laridæ*), and containing some of the most strictly oceanic birds: see PETREL. The bill is not longer than the head—large, strong, and subcylindrical, the upper mandible suddenly hooked at the point; the lower mandible with the tip curved upward; the tips of both mandibles appearing as separate pieces firmly joined to the straight part of the bill, which is marked by longitudinal grooves; the nostrils inclosed in a tube open at the extremity, and extending along the ridge of the upper mandible. The tarsi are compressed; the hind toe rudimentary, a mere claw.



Northern Fulmar (*Procellaria glacialis*).

The tail is short, and slightly rounded; the wings are long—The COMMON or NORTHERN F. (*P.* or *F. glacialis*) is a bird about the size of a duck, gray above, white beneath, the head and neck pure white, the tail white, the bill yellow; the young brownish gray. It inhabits the most northern seas, in which its numbers are prodigious; breeds on the rocky shores of the Farøe Islands, Iceland, Greenland, Spitzbergen, etc., on the grassy shelves of the precipices, making a slight nest or a mere excavation, in which it lays one egg. It is rarely seen on the coast of Britain, but more frequently in Orkney and Shetland, where it does not often breed, though it breeds in great numbers in St. Kilda and the adjacent islets of Borrera and Soa. It is of importance to the inhabitants of St. Kilda, who esteem its eggs and flesh above those of any other bird, and seek them in the most perilous manner, descending by ropes from the sum-

FULMINATE—FULMINATE OF MERCURY.

mit of the precipices. The fulmars are valued also for their feathers and down, and for their oil which is one of the principal products of St. Kilda, and is obtained from their stomachs. The old are said to feed the young with it; and when they are caught or assailed, generally lighten themselves by disgoring it. It is amber-colored, and has a peculiar and very disagreeable odor. Fulmars feed on all animal substances which come in their way, preferring fat, and delighting in the blubber of whales. They pursue whales to prey on the cirrhopods which are attached to them or imbedded in their skin. Multitudes of the birds soon gather around a dead whale, and they are so bold as to advance within a few yards of the men who are cutting it up. When food is abundant, they often glut themselves until they are unable to fly. They follow the greasy track of a whaler; indeed, some of them are always in attendance on ships immediately after they pass n. of the Shetland Islands, ready to seize any garbage that may be thrown overboard. Sailor-boys often amuse themselves in catching them by means of lines and hooks baited with fat.

Another species of F. (*P.* or *F. Pacifica*) exists in the Pacific Ocean, and the MOTHER CAREY'S GOOSE or CHICKEN of sailors, a large bird of the southern seas, is sometimes referred to the same genus.

FULMINATE, v. *fŭl'mĭ-nāt* [L. *fulmĭnātus*, thundered, struck or blasted with lightning—from *fulmen*, thunderbolt, lightning: It. *fulminare*: F. *fulminer*]: to make a loud sudden noise; to cause to explode; to utter or send out a denunciation of censure: N. a substance which explodes by percussion, rubbing, or heat; a salt of fulminic acid. FULMINATING, imp.: ADJ. thundering; exploding with a crack and flash. FULMINATED, pp. FULMINATION, n. -*nā'shŭn* [F.—L.]: the utterance of threats or censure; explosion of certain chemical preparations. FULMINATORY, a. -*nā'tēr-ĭ*, thundering; striking terror. FULMINIC ACID, a. -*mĭn'ĭk*, an acid related to cyanic acid. It has never been isolated in the hydrated form, but from the composition of its salts, its formula doubtless is $C(NO_2)H_2 \cdot CN$: it is thus isomeric with cyanic acid. Fulminic acid may be separated from the oxide of mercury and silver, and combined with other bases, such as potash; and all such compounds are more or less explosive. FULMINE, v. *fŭl'mĭn*, in *OE.*, to dart like lightning; to thunder; to speak with irresistible power. FULMINURATES, n. -*ŭr'āts*, salts of fulminuric acid, $C_3H_3N_3O_3$.

FULMINATE OF MER'CURY, or FULMINATING MER'CURY ($Hg_2C_2H_2O_2$): substance in the form of white silky needles, best prepared by dissolving 3 parts of mercury in 36 of nitric acid of specific gravity 1.34, without the application of heat, in a flask capable of holding 18 times the bulk of the acid. The solution is then to be poured into a large vessel containing 17 parts of alcohol of specific gravity 0.830, and immediately to be re-transferred to the flask, which is still full of nitrous vapors, and with which it must be well shaken, in order to effect their absorption. Effervescence commences in a few minutes, and soon

FULMINATE OF SILVER—FULTON

becomes extremely violent; and at the same time there is a deposit of metallic mercury which is gradually re-dissolved. The reaction must be moderated by the gradual addition of 17 parts more of alcohol; and on cooling, crystals of the F., amounting to 4.6 parts, are deposited: these must be washed with cold water, and dried at 100° F. F. of M. may be handled without much danger when moist; but when dry, it explodes with violence when struck by a hard body, or when touched with nitric or strong sulphuric acid. A mixture of 1 part of this salt with 6 parts of nitre—or of 3 parts of the F., 5 of chlorate of potash, 1 of sulphur, and 1 of ground glass—is employed as the priming of percussion-caps; applied as a dry powder, and made to adhere to the cap by the application of a drop of shellac varnish.

FULMINATE OF SILVER, or **FULMINATING SILVER** ($\text{Ag}_2\text{C}_2\text{N}_2\text{O}_2$): substance prepared in nearly the same manner as the fulminate of mercury (q.v.); and more powerfully explosive. Even when moist or under water, pressure with a hard body will cause its explosion; and when quite dry, the slightest friction between two hard bodies produces a similar result. The preparation of the fulminates is attended with danger, and should be attempted by none but professed chemists.

FULSOME, a. *fŭl'sŭm* [perhaps AS. *ful*, foul; Eng. *some*, full of]: *literally*, fulfilling or satisfying; distasteful; disgustingly fawning or obsequious; nauseous; cloying rank and gross, as a *fulsome* speech; in *OE.*, abundant. **FUL'SOMELY**, ad. -ly. **FUL'SOMENESS**, n. offensive grossness.

FULTON, *fŭl'ton*: village in Volney tp., Oswego co., N. Y.; on the e. bank of the Oswego river; on the New York and Oswego Midland, and the Oswego and Syracuse railroads; also on the Oswego canal; 12 m. s.s.e. of Oswego, 25 m. n. of Syracuse. It has two national banks (cap. \$223,600), one savings bank, six churches, a female seminary, several graded schools, three woolen mills, two flouring mills, two machine shops, and two weekly newspapers. Abundant water-power is afforded by Oswego river. Pop. (1870) 3,507; (1880) 3,941; (1890) 4,208; (1900) 5,281.

FULTON, JUSTIN DEWEY, D.D.: Baptist preacher: b. Earlville, N. Y., 1828, Mar. 1. He graduated at the Univ. of Rochester 1851, studied in the Rochester Theol. Seminary, and was ordained pastor of a Bapt. Church, St. Louis, 1853. He preached in Sandusky, O. 1855-59, Albany 1859-63, building the Tabernacle Bapt. Church in the meantime, 1863-73 in Tremont Temple, Boston, and 1873-87 in Brooklyn. In the latter year he resigned his pastorate for the purpose of applying himself to the conversion of Rom. Catholics to Protestantism. He is a popular lecturer and sharp controversialist, and published *The Roman Catholic Element in American History* (1859); *Life of Timothy Gilbert* (1864); *Woman as God Made Her* (1867); *The Way Out* (1870); *Show Your Colors* (1881); and *Rome in America* (1884). He received the degree of D.D. from the Univ. of Rochester 1871. D. 1901, April 16.

FULTON, *fûl'ton*, ROBERT: 1765-1815; b. Little Britain, Penn.: engineer. His parents had emigrated from Ireland, and were in poor circumstances, so that all the education given to young F. was the ability to read and write; but he used what he had, and passed in study the time allowed for recreation. When he was old enough, his mother apprenticed him to a jeweller in Philadelphia. In addition to his labors at this trade, he applied himself to painting; and the sale of his portraits and landscapes enabled him, in four years, to purchase a small farm, on which he placed his mother, his father being dead. At the age of 22, he went to London, where he studied painting under West; but after several years he felt that this was not his true vocation, and turned wholly to mechanics. Some works that he performed in Devonshire obtained him the patronage of the Duke of Bridgewater, likewise of the Earl of Stanhope. In 1794, he obtained from the British govt. a patent for an inclined plane, the object of which was to set aside the use of locks in canals; and in the same year, he invented a mill for sawing and polishing marble. His next invention was a machine for spinning flax, followed by one for making ropes. He was received as a civil engineer 1795; and wrote a work on canals, in which he developed his system. On invitation from the U. S. minister at Paris, he went to that city 1796, and remained there seven years, busied in new projects and inventions. Among his inventions here was the *nautilus* or submarine boat, for naval warfare, which he in vain submitted for adoption to the French and the British govt. He next turned to a subject that had frequently occupied his mind, and about which he had written a treatise 1793—viz., the application of steam to navigation. In 1803, he constructed a small steamboat, and his experiments with it on the Seine were successful; but disgusted with the reception of his enterprise, he returned 1806 to New York and pursued his experiments there. He perfected his *Torpedo* (q. v.) system, afterward employed effectively in the war between the United States and Britain. In 1807, he launched a steam-vessel on the Hudson, which made a successful start, in the presence of thousands of astonished spectators. Beginning with this period, steamers (for the construction of which F. received a patent from the legislature) came into use upon the rivers of the United States. Though F. was not the first to apply steam to navigation—as a steam-vessel had been tried upon the Forth and Clyde Canal as early as 1789, and John Fitch (q. v.) had launched a steam-packet on the Delaware 1787—yet he was the first to apply it with any degree of success (see STEAM-NAVIGATION). F.'s reputation was now established, and he was employed by the U. S. govt. in the execution of various projects with reference to canals and other works. In 1814, he obtained the assent of the legislature to construct a steam-frigate, which was launched in the following year. Though his labors had such great success, various lawsuits in reference to the use of some of his patents, prevented him from ever becoming wealthy; and anxiety, as well as excessive application, tended to shorten his days. His death produced

extraordinary demonstrations of mourning throughout the country.—F. married, 1806, a niece of Robert Livingston, U. S. minister to France.

FULVOUS, a. *fūl'vūs* [L. *fulvus*, of a deep yellow]: yellow; tawny; of a saffron color.

FULWA, n. *fōl'wā* [Nepaulese, *phulwara*, name of the tree]: a solid buttery oil obtained from *Bassia butyracea*.

FUM, *fūm* (properly, **FUNG**, *fūng*, the first being the Portuguese pronunciation): the Chinese Phoenix—one of the four mystical and symbolical animals supposed to preside over the destinies of the Chinese empire. Its appearance is declared to indicate an age of universal virtue, the influence of which has extended throughout creation. It is supposed to originate from the element of fire, and to be born in the Tan-heuë, or Hill of the Fiery Halo of the Sun; to have the forepart of a goose, hind-quarters of a stag, neck of a snake, fish's tail, fowl's forehead, down of a duck, dragon's marks, the back of a tortoise, face of a swallow, and beak of a cock, with beak, claws, and feathers of various colors, red crest, and golden beak. It is about six cubits high, and comes from the East. In mystical language, it is called the Leih-kwan, or 'mandarin of time,' and is said to have a forehead like heaven, eyes like the sun, back like the moon, wings like the wind, feet like earth, and a tail like the planets. On its body are inscribed the five cardinal virtues. According to some authors, it perches only on the woo tung tree, and eats the seed of the bamboo; others describe it as swallowing small carp. Other accounts say it eats no living insect, and treads on no growing plant. Its voice is said to be like a flute, drum, or even thunder. When seen, it is followed by birds. According to Chinese history, it has occasionally appeared; and a celebrated female flute-player, named Lung-yu, is said to have enticed it from heaven with her music, and then fled away with it. Like the phoenix of the Egyptians and roc of the Arabs, the myth may have had a historical origin, subsequently disfigured by fiction. It is often represented on Chinese works of art, under the form of a gallinaceous bird, and is embroidered on the dresses of mandarins of a certain rank. It is mentioned by some modern English poets.—Kidd, *History of China*, p. 267; Ching-tsze-tung, 172 sect.; Yuen-keen-luy-han, 148 sect.

FUMAGE, *fū'māj*, in the Law of England: properly smoke-farthings, or a customary payment for every house that had a chimney or fire-hearth. This tax was abolished in the time of William and Mary. It is mentioned in Domesday as paid by custom to the king for every chimney in the house. Edward the Black Prince is said to have imposed a tax of a florin for every hearth in his French dominions. The first statutory enactment on the subject in England is by 13 and 14 Car. II. c. 10, whereby a tax of 2s. on every hearth in all houses paying to church and poor was granted to the king forever.

FUMARIA, n. plu. *fū-mā'rī-ā* [L. *fūmus*, smoke]: a

FUMARIC ACID.

genus of plants with small flowers, ord. *Fumariaceæ*; the fumitory (q. v.).—FUMARIACEÆ, nat. ord. of exogenous plants; herbaceous, with a watery juice; their leaves alternate much divided; the calyx of two deciduous sepals; the corolla of four very irregular petals; the stamens sometimes four and distinct, usually six and in two bundles; the ovary free, one-celled, one seeded, or many-seeded; the seeds having large albumen. The F. are regarded as in their botanical characters approaching most nearly to the *Papaveraceæ* (Poppy, etc.); but their general aspect is very different, and they have not the same powerful properties. Both the foliage and flowers of some have considerable beauty. *Dielytra spectabilis* is a well-known favorite in gardens and green-houses. More than 100 species are known, natives mostly of temperate climates in the n. hemisphere. The COMMON FUMITORY (*Fumaria officinalis*), frequent weed in gardens and cornfields, is of



Common Fumitory (*Fumaria officinalis*).

rather delicate and beautiful appearance. It is annual, and easy of extirpation, where it springs up in excess. It was formerly much used in medicine, having high reputation as a tonic and diaphoretic: though disused in Britain, it is still esteemed in France as a remedy in scorbutic affections, chronic eruptions, etc. Some other species of fumitory have similar properties. The leaves have an intensely bitter saline taste. See FUMITORY.

FUMARIC ACID, or BOLETIC ACID ($C_4H_4O_2$): crystalline acid substance, procured from *Fumaria* and many other plants. It was obtained first by Braconnot from a species of boletus, and has since been found in many other fungi, in numerous lichens, in various species of *Fumaria*, in *Corydalis bulbosa*, etc. It may be obtained also in association with malæic acid, by heating Malic Acid (q.v.) to 350° F.—It crystallizes in prisms, which have a very acid

FUMBLE—FUMIGATING PASTILS.

taste, are only slightly soluble in water, but dissolve readily in alcohol and ether. At a temperature of 392° F., it volatilizes without fusing, and is converted into the malæic acid above mentioned, which has the same composition as fumaric acid, but different properties. If malæic acid be exposed for a long time to a temperature of 266°, it again passes into fumaric acid, so that these acids are mutually convertible. Kekulé has shown (*Annalen d. Chemie*, 1861) that both fumaric acid and malæic acid combine directly with bromine, and produce crystals of dibromo succinic acid; and further, that if fumaric acid be dissolved in water, and digested with an amalgam of sodium, the nascent hydrogen from the decomposed water combines with the acid, and converts it into succinic acid. Its compounds are of no special interest. FUMERATES, n. -*âts*, salts of fumaric acid.

FUMBLE, v. *fūm'bl* [Low Ger. *fummelen*, to fumble: Dan. *famle*, to stammer: Icel. *falma*, to grope about]: to feel or grope about; to handle awkwardly; to handle much. FUM'BLING, imp.: ADJ. groping; managing awkwardly; to stutter or utter awkwardly. FUMBLED, pp. *fūm'blā*. FUM'BLINGLY, ad. -*lī*. FUM'BLER, n. -*bler*, one who gropes or manages awkwardly.

FUME, n. *fūm* [OF *fum*, smoke—from L. *fūmūs*, smoke: Skr. *dhūma*, smoke—from *dhū*, to agitate: It. *fumo*; F. *fumée*]: vapor from combustion; smoke or vapor; any volatile or gaseous matter emitted in an offensive form; rage; passion: V. to yield vapor; to be in a rage; to chafe with anger. FUMING, imp.: ADJ. sending forth vapor; raging. FUMED, pp. *fūmd*. FUMINGLY, ad. -*lī*. FUMELESS, a. free from fumes. FUMILY, ad. -*mī-lī*. FUMINESS, n. FUMY, a. *fū'mī*, producing smoke or vapor; full of vapor. IN A FUME, in a state of ill-temper, particularly from impatience. FUMIFEROUS, a. *fū-mīf'ēr-ūs* [L. *fērō*, I bear]: producing fumes or smoke. FUMAROLE, n. *fū'mā-ōl* [It. *fumare*, to smoke]: an opening in a volcanic district from which smoke and gaseous fumes issue forth.

FUMET, n. *fū'mēt* [F. *fumier*, dung—from L. *fīmus*, dung]: the dung of deer. FUMETTE, n. *fū-mēt'* [F.]: high flavor, as of long-kept game.

FUMIGATE, v. *fū'mī-gāt* [L. *fūmīgātus*, smoked, fumigated—from *fūmūs*, smoke]: to smoke anything; to perfume; to expose to the action of disinfecting vapors. FUMIGATING, imp. FUMIGATED, pp. FUMIGA'TION, a. -*gā'shān* [F.—L.]: use of fumes or vapors to purify or disinfect the air, and especially for counteracting contagious poisons in clothing, furniture, etc. (see CONTAGION: INFECTION). Few of the common methods have any value: for the really active processes, see DISINFECTANTS. FUMIGATOR, n. -*gā-tēr*, an instrument for fumigating. FUMIGATORY, a. -*gā'tēr-ī*, that purifies by fumes or vapors.

FUMIGATING PASTILS: compounds of various ingredients, which, by their smouldering combustion, evolve agreeable odors, but usually without any disinfecting force. The following recipe for their composition is given in the Würtemberg Pharmacopœia: Take of benzoin and dry

FUMITORY—FUNARIA.

balsam of Peru, each 16 parts; of yellow sandalwood, 4 parts; of labdanum, 1 part; of charcoal from lime-tree wood, 96 parts; of nitrate of potash, 2 parts; and of mucilage of tragacanth, enough to form the mixture into a paste, from which conical pastils are to be made by a small mold.

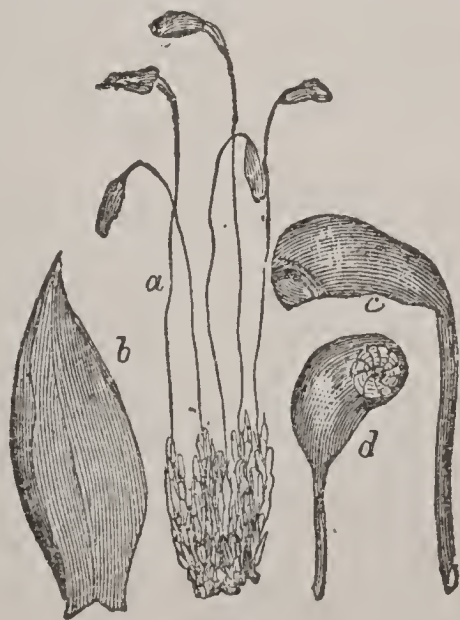
The 'Ribbon of Bruges' also is employed for aromatic fumigation in the same manner. It is prepared as follows: Dissolve two ounces of nitrate of potash in a pint of water; in this fluid, steep good undressed cotton-tape, and hang it up to dry. Prepare a tincture composed of spirit, half a pint; musk, half an ounce; otto of roses, one dram; benzoin, four ounces; myrrh, half an ounce; orrisroot, half a pound. When this tincture has stood for a month, steep the prepared tape in it. The tape when dried is fit for use. Light it blow out the flame; and as it smoulders, a fragrant vapor will rise into the air. See further, Piesse's *Art of Perfumery*.

FUMITORY, n. *fū'mī-tēr-ī* [F. *fume-terre*, the fumitory—from L. *fūmūs*, smoke; *terra*, earth—alluding to the disagreeable smell of the plant]: wild plant, with divided leaves, and spikes of little purple flowers; the genus of plants *Fumariā*, ord. *Fūmarīācēæ* (see FUMARIA). *Note*.—*Literally*, F. *fume de terre*, smoke of the earth.

FUN, n. *fūn* [prov. F. *fun*, smoke: Sw. *fun*, anything light as vapor: Icel. *fana*, to behave foolishly: Sw. *fane*; AS. *fon*, a fool]: sport; game; merriment; drollery. **FUN'NING**, n. the act of making fun; the act of making a fool of, or making game of. **FUN'NY**, a. *-nī*, droll; comical. **FUN'NILY**, ad. *-lī*.

FUNAMBULATE, v. *fū-nām'bū-lāt* [Sp. *funambulo*, a walker on a rope—from L. *fūnīs*, a rope; *ambūlō*, I walk]: to walk or dance on a rope. **FUNAM'BULIST**, n. *-līst*, a rope walker or dancer.

FUNARIA, *fū-nā'rī-a*: genus of mosses with terminal fruit-stalks, and oblique double peristome, both the inner



Funaria hygrometrica:

a, plant, natural size; *b*, leaf, magnified; *c*, capsule, magnified; *d*, capsule, magnified, with lid removed.

FUNARIACEÆ—FUNCTION.

and outer having 16 teeth. One species, *F. hygrometrica*, is of interest for the hygrometric properties of its fruit-stalk, which, if moistened in the lower part, twists several times round in one direction; and if moistened in the upper part, twists several times round in the opposite direction. This is owing to a peculiar arrangement of the cellular tissue, which is spiral in one direction at the base of the stalk, then straight, then spiral in the opposite direction. *F. hygrometrica* has very concave, ovate, entire, apiculate leaves. It is very common on old buildings and on dry barren soils; and is said to be almost always found where a wood-fire has been burning on the ground, as on the site of gipsies' encampments, etc.

FUNARIACEÆ, n. *fū-nār-ī-ā'sē-ē*: family of *Funaroidæ*, sub-ord. of operculated acrocarpous mosses.

FUNCHAL, *fōn-shāl'*: capital and only town of the island of Madeira (q.v.); on the s. side of the island, consisting chiefly of one street, extending about a mile along the shore, with numerous streets and lanes at right angles with the main street, and leading up the hill which backs the town. The roadstead is open, and its anchorage rocky and uneven. F. has a cathedral, numerous churches, and small convents, and is defended by four forts. From it all the produce of the island is exported. Pop. about 20,700.

FUNCTION, n. *fūngk'shūn* [*F. fonction*—from L. *functionem*, a performance, an execution—from *functus*, performed: It. *funzione*]: performance; office; employment, duty belonging to any particular office or station, as functions of royalty; the office of any bodily organ; power; faculty; in *arith.*, the result of certain arrangements of numbers; any number considered as formed from any other number. FUNC'TIONAL, a. *-āl*, pertaining to, or connected with, functions. FUNC'TIONALLY, ad. *-lī*. FUNC'TIONARY, n. *-ēr-ī*, one who holds an office; an official. FUNCTIONAL DISEASE, in *med.*, the derangement of an organ arising from a cause external to itself, as when indigestion causes functional derangement of the heart, brain, etc.; opposed to *organic disease*, in which the organ itself is affected; a phrase merely expressing ignorance of the cause and nature of the disease.

FUNCTION, in Mathematics: any number considered as formed from any other number. When two or more variables are combined with constants in an equation, and are such that a change of value of one implies a corresponding change of value of one or more of the others. then such variables are said to depend on, and to be functions of each other; and the expression of the mode of dependence is said to be a *function* of such variables. If such an expression involves but one variable, it is said to be a F. of one variable; if two are involved, to be a F. of two variables; and so on. Thus $\sin x$, e^{ax} , $\log. x$, $\sqrt{a^2 - x^2}$ are functions of one variable—viz. of x ; e^{ax+by} , $\tan(ax+by)$, x^y , are functions of two variables, x and y ; so xyz , $x^2 +$

$y^2 + z^2$ are functions of three variables, and so on. Functions are denoted by the symbols F, f, ϕ, ψ , etc. Thus $F(x)$ means a F . of one variable, x , combined with constants or not, as the case may be; $\psi(xyz)$ a F . of three variables. These functional symbols are *general*, and their specific forms are the particular functions which arise from operations in algebra, trigonometry, etc.

Functions are implicitly or explicitly. When one variable is expressed in terms of others, it is said to be an explicit F . of them; but when all the variables remain involved in one expression, the F . is said to be implicit. Thus, $x^2 + y^2 - r^2 = 0$ is an implicit F . of two variables, but $y = \sqrt{r^2 - x^2}$ is an explicit F . of one variable. In explicit functions, the variable which is expressed in terms of the others is called the *dependent* variable, and the others the *independent* variables. Explicit functions are written usually in the form $z = f(xy)$; implicit in the form $u = F(xyz) = 0$. Functions, again, are algebraical or transcendental. Algebraical functions are those which involve the operations of addition, subtraction, etc., and of involution and evolution. Transcendental functions are those where the operations symbolized are such as e^x , $\log_e x$, $\sin x$, etc.—i.e., exponential, logarithmic, or circular. Functions, also, are simple or compound according as they involve one or several operations. $y = \sin x$ is a simple F ; but $y = \log. \sin x$ is compound. Further, functions are divided into the continuous and the discontinuous, the circulating and the periodic. Continuous functions are such as are subject to the following conditions: 1. As the variable gradually changes, the F . must gradually change; 2. The law symbolized by the functional character must not abruptly change. Circulating functions are those whose values lie within certain limits for all values of the variables. $y = \sin x$ is an example at once of a continuous and of a circulating function. A F . is said to be periodic when it takes the form $f^n(x) = x$, signifying that if on x the operation f be performed n times, the resulting value will be x . Thus, $f(x) = \frac{1}{1-x}$ is a periodic

F . of the third order. For performing the operation indicated by f the second time on $\frac{1}{1-x}$ as the variable, we have

$$f^2(x) = \frac{1}{1 - \frac{1}{1-x}} = -\frac{1-x}{x}; \text{ and the third time we have}$$

$$f^3(x) = \frac{1}{1 - \left(\frac{1-x}{x}\right)} = x. \text{ The functional calculus is a recent}$$

growth of the transcendental analysis. The object of the Differential Calculus (q.v.) is generally to ascertain the changes in functions arising from the continuous and infinitesimal variation of their subject variables. The object of the new functional calculus is, speaking generally, to investigate the forms of functions and their growth, when they are subject to a continuous and infinitesimal change as to form,

According to Mr. Price (treatise on the Infinitesimal Calculus), as the differential calculus investigates properties of continuous numbers, so does the new calculus the properties of continuous functions; and as there is an integral calculus of numbers, so there is an inverse calculus of functions. Of the new calculus, the Calculus of Variations (q.v.) may be considered the main branch. It includes, of course, the subject of functional equations. Functional equations are those in which it is required to determine from equations the forms of functions entering them; e.g., what is the F of x and y which satisfies the equation $f(x) \times f(y) = f(x + y)$? See CALCULUS OF FUNCTIONS in *Encyclopædia Metropolitana*.

FUNCTUS OFFICIO, *fŭngk'tŭs ăf-fŭ'shŭ-ô* [Lat. 'having discharged a duty']: legal term applied to a person who has completed or fulfilled an obligation laid upon him; a warrant of attorney on which a judgment has been entered; a bill of exchange sent to the drawee and credited by him to the holder; or a warrant on which a person has been arrested.

FUND, n. *fŭnd* [OF. *fond*, a bottom, a floor—from L. *fundus*, a farm, an estate; It. *fondo*; F. *fonds*, funds, stock]: that out of which supplies are drawn; a stock or bank of money; ample store; permanent debts due by government paying interest are called the *funds* or *stocks*: V. to place money in a fund; to put lent money into the form of permanent bonds or stock bearing regular interest. **FUND'ING**, imp. a. putting into the funds; placing in the condition of a funded debt; arranging to hold money borrowed for public purposes, as a perpetual loan at a certain interest; thus obligations are from time to time said to be converted from floating into funded debts. **FUND'ED**, pp. a. placed in the funds or public stocks as a permanent investment; put into the form of bonds or stock. **FUND'LESS**, a. **FUND-HOLDER**, one having money invested in *the funds*. **FUNDING SYSTEM**, the governmental plan and method of transferring temporary into permanent obligations; the organization for buying and selling the right to become a public creditor and to receive a share of the interest on the national debt: see **DEBT, NATIONAL**.

FUND, SINKING: sum of money set apart (which may be increased at fixed intervals) for extinguishing all, or part of, a public debt.

In Great Britain the S. F. was begun 1716 by Sir Robert Walpole. Certain taxes previously laid for limited periods were then rendered perpetual, for the purpose of paying the interest of the funded debt. They produced more than enough for this purpose, and the surplus was laid aside, that it might accumulate into a fund for paying the debt. It appeared to operate well, since, 1728, after twelve years, debt was wiped off to the extent of £6,648,000. It was not observed that, during the wiping off, new debt had been created to about the same extent, so that the nation was just in the position in which it would have been had it neither borrowed or repaid. It is supposed that Sir Robert may have seen the

FUNDAMENT.

fallacy of the S. F., since in 1732 he took half a million from it to meet the expenditure of the year, instead of raising a new loan. In 1786, the system was established on a great scale by the younger Pitt, who, notwithstanding his great practical abilities, was entirely misled by the theories of Dr. Price in his work on Annuities. The system continued on an enormous scale, until another student of economy and figures conclusively proved it useless ; this was done 1813 by Dr. Hamilton, in *Inquiry concerning the Rise and Progress, the Redemption and Present State, and the Management of the National Debt of Great Britain*. The fallacy which Dr. Hamilton showed to pervade a sinking fund may be explained by a simple example. Suppose that one requires to borrow £100, and lays by £5 a year as a fund to pay it with. Accumulating at compound interest, this fund will pay back the loan in about 15 years. The borrower will, however, gain no more by the process than if he paid the £5 a year to his creditor, for his debt would be diminishing to precisely the same extent as the fund to pay it off would be increasing. Suppose that while requiring only £100, the borrower raises £200, and lends out £100, accumulating the interest until the whole amounts to £200 ; the borrower will no doubt be receiving interest on £100, but he will be at the same time paying interest on £200 ; and he would repay his debt at the same cost and with more simplicity if, instead of borrowing the second hundred at 5 per cent., he paid over £5 a year to his creditor. In these instances, nothing is lost by the sinking fund. But suppose that in the last case the creditor had agreed to lend the £100 at 5 per cent., but in consideration of the greater risk, would not lend the £200 at less than 6 per cent., while the borrower can get only 5 per cent. for the half which he relends—here the transaction would cause a dead loss of £2 a year over the plan of repaying by instalments. This was exactly the case with the British sinking fund. The more money the chancellor of the exchequer wanted, the higher were the terms demanded by the lenders, and the addition to each loan for setting aside a sinking fund increased the rate of interest paid on it. See DEBT, NATIONAL.

FUNDAMENT, n. *fün'dä-měnt* [L. *fundamentum*, groundwork, basis: It. *fondamento*: F. *fondement*]: the foundation; the seat of the body. **FUN'DAMEN'TAL**, a. pertaining to or serving for the foundation; essential; primary; leading: N. a leading or primary principle or article; essential. **FUN'DAMEN'TALS**, n. plu. *-tälz*, essential parts, as fundamental truths. In the Christian system of facts and truths, certain points are fundamentals, i.e. essential in the very existence of the system; yet it is a mistake thence to conclude that *knowledge* on those points is fundamental to an actual Christian estate known as a 'state of salvation,' since such a conclusion would shut out the patriarchs and prophets. But a wilful ignorance or neglect of these fundamentals would be fatal to Christian life. **FUN'DAMEN'TALLY**, ad. *-täl'li*. **FUN'DAMENTAL'ITY**, n. *-täl'i-ti*, character of being essential. **FUNDAMENTAL BASS**, in *music*, the root or foundation note of the harmony: see HARMONY.

FUNDI—FUNERAL RITES.

FUNDI, *fŭn'dĭ*, or **FUNDUNGI**, *fŭn-dŭn'jĭ* (*Paspalum exile*): kind of grain much cultivated in the w. of Africa; allied to the millets, and still more nearly to some kinds of grain cultivated in India: see **PASPALUM**. It is wholesome and nutritious, and has been recommended to attention in western lands as a light and delicate food for invalids. The natives of w. Africa throw it into boiling water, pour off the water, and add palm-oil, butter, or milk. By Europeans and negroes in Sierra Leone, it is much used with stewed meat, and sometimes made into porridge with milk.

FUNDUS, n. *fŭn'dŭs* [L.]: in *anat.*, the base of any cone-shaped organ; in *bot.*, the place where the stem and root join.

FUNDY, *fŭn'dĭ*, **BAY OF**: arm of the Atlantic, separates Nova Scotia from New Brunswick and the state of Maine. With an average breadth of 35 m., it extends 180 m. in length n.e. to s.west. It forks, at its head, into two inlets, the n. called Chignecto Bay, and the s. Minas Channel, which are divided by narrow necks of land from the Gulf of St. Lawrence. Along its n.w. side, reckoning downward, it receives the St. John, the principal river of New Brunswick, and the St. Croix, which, through its entire course, forms the international boundary. The navigation is perilous by the peculiarity of the tides, which are said to rise and fall 70 ft. at certain seasons.

FÜNEN: see **FÜHNEN**.

FUNERAL, n. *fŭ'nĕr-ăl* [mid. L. *funerālis*, relating to a burial: F. *funĕraillēs*—from mid. L. *fŭnĕrālĭā*, a funeral: It. *funerale*, a burial—from L. *fŭnĕs*, a dead body, a burial]: the ceremony of burying a dead human body: **ADJ.** pertaining to or used at a funeral. **FUNEREAL**, a. *fŭ-nĕ'rĭ-ăl*, suiting a funeral; dark; solemn; mournful. **FUNE'REALLY**, ad. *-lĭ*. **FUNERAL SACRIFICE**, the slaying of men or animals to accompany the soul of an eminent person to the world of spirits; the former to give him what assistance he needs, the latter to supply him with food. It was an early and wide-spread heathen custom.

FU'NERAL EXPEN'SES, in Law: a privileged debt, allowed before all other debts and charges, if limited appropriately to the person and the occasion. If the parties primarily liable neglect the duty of giving decent burial to the dead, a stranger may do so, and claim reimbursement out of the effects of the deceased before all others having right

FU'NERAL RITES: methods and ceremonies of disposing of the dead. These have had vast variety as connected with observances dictated by affection, religious conviction, or superstition. For description of the principal modes of interment, and the accompanying funeral rites of the ancients, see **BURIAL**.

With the spread of Christianity came the decorous interring of the dead with religious offices indicative of hopes of a blessed resurrection. From the moment of death until interment, the body is the object of solemn ceremonial in

FUNERAL RITES.

the Rom. Cath. Church. At death, a crucifix is placed in the hand, or at the feet, and holy-water is sprinkled. The chief funeral rites are solemnized in the church, into which the coffin is borne and placed on a bier. Throughout France, the Netherlands, and continental Europe generally, the ordinary cortège of a funeral is a hearse with a bier, on which is the coffin, covered with a pall, followed by carriages all in black, with black horses. The same arrangement is usual in England and the United States, but the hearse, sometimes over-decorated with dark plumes, is closed instead of being open. In a more humble class of funerals, the coffin, shrouded in a pall, is borne on spokes, or on the shoulders of bearers. All the attendants are in black. A certain etiquette as to pall-bearers (in England, persons who hold ribbons attached to the pall) is observed; the relatives of the deceased taking their place nearest the head in the degree of consanguinity, and the same arrangement is maintained in lowering the coffin by cords into the grave. In the United States, pall-bearers are those who actually carry the coffin, or in some cases who walk close by its side near the men employed to bear its weight. The deposit of bodies in leaden coffins and within a vault is not a growing practice, though sometimes done: there is increasing appreciation of the propriety of allowing corpses to dissolve and mingle with the earth of the grave. There is more of religious observance in recent years than was formerly among the non-prelatical denominations, to whom, a few generations ago, such services savored of prayers for the dead.—Formerly, in the case of important personages, the hearse was preceded by a class of undertaker's men to clear the way, designated *saulies*, and gumpheon-men—these last bearing a pole shrouded at the top with black silk, called a gumpheon (*gonfalone*, a banner), being a relic of an ancient heraldic ceremonial: this custom has nearly if not altogether disappeared. At Scotch funerals, the relatives, and in some cases the friends of the deceased, wear white cambric *weepers* at the wrists. In Scotland till within the present century, there was a practice of giving a series of expensive entertainments to guests at funerals, beginning with the *lykwake*, and ending with the *dredgy* (dirge); but all this is gone, or nearly so. The giving of costly entertainments was not confined to Scotland and Ireland. Taking its rise in ancient customs perpetuated by the Anglo-Saxons, the practice of consuming meat and drink in a species of gloomy festivity at funerals was common in England, and carried to an extravagant length at the decease of persons of distinction, on which occasion doles (q.v.) were also given. It had its counterpart in the usages of the ancients. The *nekrodeipnon*, or funeral-banquet, is mentioned by Lucian and Cicero. It was always celebrated in the house of the nearest relative of the deceased, and Demosthenes, the patriot orator of Greece, tells us in his Oration, *On the Crown*, that the relatives of those who were slain at Chaeroneia were entertained by him in his own mansion, as if he were the nearest kinsman of the fallen heroes. The *nekrodeipnon* is often represented

FÜNFHAUS—FUNGAL.

on funeral monuments. For some curious information respecting old funeral entertainments, see Brand's *Popular Antiquities*, ed. by Ellis. Without losing as regards decorum, and indeed with great gain in many directions, funeral arrangements might be greatly cheapened and simplified.

FÜNFHAUS, *fünf hows*, or FUNFHÄUSEL, *fünf hoy-zel*, or HANGENDENLISSEN, *hâng'ên-den-lis'sên*: town of Austria, two m. n. of Vienna, of which it is a suburb. Pop. (1880) 39,967.

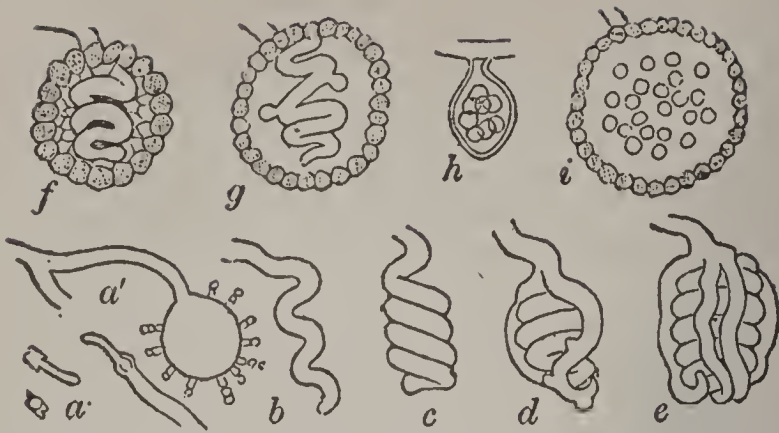
FÜNFKIRCHEN, *fünf kîrch-ên* ('Five Churches;' Hungarian, *Pecs*): important town of Hungary, cap. of the county of Baranya; on the s. slope of the Mecseg Mountains, near the Slavonian boundary, 105 m. s.s.w. of Pesth. It is the seat of a bishop, and is one of the oldest as well as one of the most pleasantly situated and beautiful towns of Hungary. It formerly possessed a university. The most important buildings are the large and imposing cathedral, the bishop's palace—an Italian structure, the town-house, lyceum, gymnasium, seminary, and the numerous and beautiful churches. It has important tanneries, woolen and flannel weaving and silk-spinning; produces wine, fruit, and tobacco; has coal-mines and ironworks, and a flourishing trade in hogs and gall-nuts. Pop. (1890) 34,067.

FUNG: see FUM.

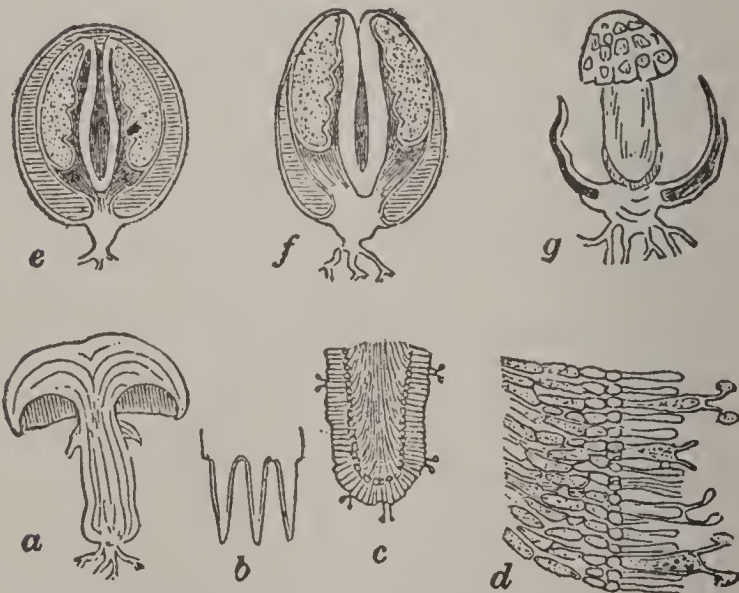
FUNGAL: see under FUNGUS.

FUNGI.

FUN'GI: order of acotyledonous or cryptogamous plants, containing a very great number of species, nearly 5,000 being known, while it is probable that a great number more are unknown. They are among the lowest forms of vegetable life, and some naturalists of good reputation have entertained the notion that they spring into existence in certain circumstances, not from germs previously existing, but from a mucus capable of organization, or through changes in the cells of more highly organized plants, and of animals in states of disease or of decay: this opinion is generally rejected as having no foundation in accurate observation; as not necessary to explain the readiness with which certain F. almost invariably spring up in certain circumstances—from which is derived the chief argument in its favor; as opposed to all analogy of ascertained facts; and as rendered improbable by the abundant provision which all the F. possess for the perpetuation and diffusion of the species. F. are cellular plants, the cells sometimes elongated so as to become filaments. They consist of a *thallus*, which spreads in a matrix, and is nourished by it, and from which stems are thrown up into the air, bearing the fructification. The organs connected with fructification are often the principal part of F. and the thallus very small, consisting of a few cottony threads, or closely compacted cells, or even altogether undiscernible. Not unfrequently, however, the proportion of the thallus is comparatively great, and in circumstances unfavorable to the development of the organs of fructification, it extends itself greatly in the matrix, as in the case of Dry Rot, Ergot, etc. (q.v.), and even of the common mushroom. The thallus of F. is called *mycelium* [Gr. *mykes*, a mushroom], and in mushrooms and some other kinds is further popularly known as the *spawn*. F. are nearly related to algæ and to lichens, but differ from both in deriving their nourishment from the earth or from the bodies on which they grow, not from the medium by which they are surrounded. They differ also from lichens in their generally much softer substance and their fugacious character; also in being quite destitute of green granules (*gonidia*) in the thallus, which are characteristic of that order. They differ from algæ in not living immersed in water or other liquid, but producing their fructification in air. The lowest forms of F. and the lowest forms of algæ, are sometimes, however, not easily distinguished; and the mycelium of some of F. is capable of spreading in a liquid, and assuming a modified appearance extremely resembling that of some algæ. It is supposed to be the presence of the *mycelium* of certain F. which makes liquors 'mothy;' and to a similar cause is ascribed the ropiness of the dough in some bakehouses, an evil not easily cured.—From other plants in general, F. differ in their chemical composition, which is remarkably nitrogenous, and assimilates them to animal organisms; while unlike other plants, they do not absorb carbonic acid from the air, and give out oxygen, but, like animals, absorb oxygen, and give out carbonic acid; so that some naturalists have proposed to constitute for them a distinct kingdom of nature intermediate between the animal and the vegetable.



Fungi. — *Eurotium Aspergillus glaucus*: *a*, A germination of spore in three phases; *a'*, Head of reproductive hyphæ-bearing spores; *b, c*, Appearance of conjugating filaments; *d, e*, Growth of enveloping coat, complete in *f*; *g*, First appearance of asci (two buds); *h*, A ripe ascus; *i*, Spores lying loose and ready to be set free.



Fungi.—*a*, Vertical section of an agaric (*Hymenomycetes*); *b*, Section of three 'gills'; *c*, Section of tip of gill, showing course of hyphæ-bearing basidia, of which five bear spores; *d*, Portion more highly magnified; *e*, Young *Phallus* (*Gasteromycetes*); *f*, The same at moment of rupture of peridium; *g*, More fully opened (the same figure on a smaller scale).

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F. are very various in size, many being scarcely visible without a microscope, while others are several feet in diameter. Even the same species, however, often shows great variety, not only in size, but in other particulars, according to the different circumstances of its growth, causing great difficulty to the botanist; while further difficulty arises from the modifications of imperfectly developed mycelium, of which many spurious genera have been constituted. A great resemblance in general appearance to F. is sometimes seen in diseased portions of leaves, etc., and in the secretions caused by the attacks of insects.—When the spore (seed) of a fungus germinates, it sends out radiating filaments, which generally branch and interlace; and portions of this mycelium removed to another favorable situation, grow there, so that F. are propagated by this means as higher plants are propagated by their tubers or by the division of their roots. The F. of simplest structure or lowest organization consist of nothing more, when they have reached their fullest development, than masses of spheroidal cells, spores, breaking up into a fine powder, as in some of the small parasitic species which are very injurious to grain. Sometimes these cells are united into jointed threads. In species of rather higher organization, the plant consists of jointed threads, but the spores are formed in the enlarged terminal joints, and are dispersed by their bursting. In the higher kinds, the spores are produced in or on peculiar organs of extremely various shape and character. In some, as puff-balls, the whole interior of the plant is filled with the fructification. In agarics, boleti, morels, etc., the fructification takes place on a particular membrane, a part of the external surface of the plant, called the *hymenium*, variously situated (in agarics on the under side of the *pileus* or cap), the extent of which is often greatly increased by wrinkles, plates or *gills*, pits, pores, etc. These form the highest division of F. called *Hymenomycetes*, in the system of Fries, the greatest European continental authority in mycology, as this department of botany is sometimes termed. Berkeley, who, without any near rival, occupies the first place among the mycologists of Britain, divides F. into two ‘classes;’ the first class not having the spores inclosed in tubular sacs (*asci*) or vesicles, and containing the ‘orders’ *Hymenomycetes* (agarics, boleti, etc.), *Gasteromycetes* (puff-balls, etc.), *Coniomycetes* (rust, smut, etc.), *Hyphomycetes* (mold, mildew, *botrytis*, *oidium*, etc.); the second class containing two orders, *Ascomycetes* (morels, truffles, etc.), in which the spores are definitely arranged in *asci*, and *Physomycetes* (some kinds of mold, plants which grow on fermenting substances, and some of the minute pests of cultivated plants) in which the spores are in vesicles without definite arrangement.

F. generally grow in damp situations, but there are many which occur chiefly on dry soils or on dry substances; and some appear in their greatest perfection in the finest summer weather, though many are most abundant in the colder and moister seasons of the year. It has been commonly asserted that they abound more in the colder parts of the world than within the tropics, but probably this opinion has its origin

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merely in imperfect observation of tropical species. The extreme rapidity of their growth, the briefness of their whole existence, the readiness with which they pass into decomposition, and the difficulty of preserving most of them in a form fit for examination, have been great obstacles to their scientific study. It is known, however, that some species are of very wide geographic distribution, while others are comparatively very limited. Some species grow in earth, others in various kinds of putrescent or fermenting animal or vegetable matter, many in decaying parts of trees or on dead wood, others on diseased animal and vegetable tissues, etc. It appears to be the office of many of them to hasten the decomposition of animal, and particularly of vegetable substances. Some of the minute kinds appear to be the cause of disease in the higher kinds of plants which they attack, and are formidable to the farmer and the gardener. Some are in like manner destructive to animal life, as in the case of the Muscardine (q.v.) or Silk-worm Rot, and certain species of *Sphæria* which grow from living caterpillars. See ENTOPHYTES.

Some F. are remarkably phosphorescent. Thus the undeveloped mycelium of some kinds produces a beautiful luminosity in some German coal-mines; and a species of agaric (*Agaricus Gardneri*), growing on palms in Brazil, shines brightly in the night. *Agaricus olearius*, also, native of the s. of Europe, is luminous.

The chemical examination of F. yields in large quantity a substance called *Fungine*, now regarded as consisting of cellulose and fatty matter, several other nitrogenous substances, an acid called *Fungic Acid*, a kind of sugar, etc. The poisonous properties of some are ascribed to an alkaloid called *Amanitine*. Others appear to owe their poisonous character to an acrid volatile substance. Many of the smaller F. are important because of the injury which they cause to crops, timber, etc. A few species are used in medicine, of which the only one really important is Ergot of Rye. One or two are used as tinder (see AMADOU), Moxa (q.v.), etc. The smoke produced by burning the dust (spores) of ripened puff-balls has anæsthetic properties, and is used for stupefying bees. *Polyporus squamosus* cut into slices makes the best of razor-strops. But the chief economical use of F. is for food, and in the manufacture of the sauce called catsup or Ketchup (q.v.).

Edible Fungi.—Many F. of the sub-orders *Hymenomycetes*, *Gasteromycetes*, and *Ascomycetes* are edible; and some are much esteemed as delicacies, while in many countries they are an important part of the food of the people. In America and Britain, very few are used, many of those species which are most esteemed on the continent of Europe being utterly disregarded, and indeed classed in popular estimation with toad-stools as poisonous. The truth appears to be, not that the greater number are poisonous, and only a few edible, but that the noxious species are comparatively few, the principal danger arising from the similarity of some of the poisonous and some of the edible agarics, and from the liability of some of the edible species

to acquire poisonous properties in particular situations and circumstances. This is notably the case with the common mushroom (*Agaricus campestris*), which is far more generally used in America and Britain than any other edible fungus, but of which some varieties are unsafe, apparently in consequence of the circumstances of their growth. From the markets of Rome and other cities of Italy, where numerous species of F. are extensively sold, this species is rigorously excluded. So important an article of food are F. in Italy, that in the market of Rome alone they are supposed to be sold to the value of about \$20,000 a year. For weeks, both in spring and in autumn, F. are the principal and almost the sole food of multitudes of the poor in Italy, Germany, and France; and besides those which are eaten fresh, great quantities are used dried or preserved in oil, vinegar, or brine. The soaking of F. in vinegar or brine takes away the acrid qualities of some which are dangerous when fresh, and renders them perfectly safe. So valuable are F. esteemed, that some species are frequently cultivated. The cultivation of the common mushroom (q.v.) is familiar, but other species of *Agaricus*, *Boletus*, etc., are plentifully raised in some parts of the continent of Europe, by watering the ground in places appropriate for them with water in which mature plants abounding in spores have been bruised; others are obtained by merely placing in favorable circumstances substances in which their spores are already contained. Thus, a species of *Polyporus*, much esteemed, is procured in Italy by moistening a porous stone [Ital. *Pietra fung-haia*] over which a little earth has been scattered; another species of *Polyporus* by slightly charring and then watering blocks of the wood of the common hazel; a species of *Agaricus*, by cutting off and then watering the heads of black poplar trees; and another *Agaricus*, by placing the grounds of coffee in circumstances favorable for the growth.

It is a common notion, but utterly destitute of foundation, that dangerous F. may be distinguished from those which it is safe to eat by their discoloring a silver spoon if they are stirred with it while they are being cooked. Nor is greater dependence to be placed on the rule that the more readily deliquescent F. are poisonous; nor on peculiarities of color of the flesh or juice, except so far as these characters may avail for the discrimination of particular species whose qualities are known. The edible F. have generally an agreeable smell and taste, while some of the poisonous kinds are offensive both to the nostrils and the palate, but no trustworthy general rule can be laid down on these points; and some of those which are very pungent and acrid when raw, become bland and wholesome when cooked, their acidity being dissipated by heat.

Among the most important edible fungi are:

Hymenomyces.—The Common Mushroom, Champignon, and numerous other agarics and F. closely allied to true agarics, as species of *Cortinaria*, *Cantharellus*, etc.: see MUSHROOM.

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A number of species of *Boletus* (q.v.), and of *Polyporus*: see AMADOU. *Fistulina hepatica*: see FISTULINA. Several species of *Hydnum* (q.v.). Several species of *Clavaria*;



Clavaria Botrytis.

beautiful F., with a thickish stem which divides into numerous small branches. It is said that all the species of this genus are esculent, though some are much superior to the rest in flavor and delicacy. One species (*C. flava*) is popularly known in Germany as *Ziegenbart* or Goat's-beard. They grow on the ground in woods and pastures.

Gasteromycetes.—Different kinds of Puff-ball (q.v.), in a young state, and while still fleshy throughout.

Ascomycetes.—Different species of Morel (q.v.), *Helvelles* (q.v.), *Verpa*, *Peziza*, etc. The Common Truffle (q.v.), and allied species. *Cyttaria Darwinii*, which grows on living branches of S. American beeches, and is a principal part of the food of the natives of Tierra del Fuego during some months of the year.

The remaining observations are taken in general from Taylor *On Poisons*. It is a curious fact that the poisonous properties of mushrooms vary with climate, and probably with the season of the year at which they are gathered. Another noticeable fact is, that by idiosyncrasy some individuals are liable to be seriously affected even by those species usually regarded as innocent. Some species poisonous in this country are used freely by the Russians, who it appears are in the habit of salting, boiling, and compressing them before they are eaten; this may in some instances account for their having no noxious effects.

Symptoms and Effects.—The noxious species of mushrooms act sometimes as narcotics, at others as irritants. It appears from the reports of several cases, that when the narcotic symptoms are excited, they come on soon after the meal at which the mushrooms have been eaten, and that they are manifested chiefly by giddiness, dimness of sight and debility. The person appears as if intoxicated, and there are singular illusions of sense. Spasms and convulsions have been occasionally witnessed among the symptoms when the case has proved fatal. In some instances the symptoms of poisoning have not commenced until 30 hours after the meal; and in these, narcotism followed the symp-

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toms of irritation. It might be supposed that these variable effects were due to different properties in the mushrooms, but the same F. have acted on members of the same family, in one case like irritants, and in another like narcotics. In most cases recovery takes place, especially if vomiting be early induced. In the few instances which have proved fatal, there has been greater or less inflammation in the stomach and bowels, with congestion of the vessels of the brain.

Treatment.—‘The free use of emetics and castor oil.’—*Taylor On Poisons.*

See Dr. Badham’s *Treatise on the Esculent Funguses of Great Britain*: and *Fungi*, by M. C. Cooke, edited by Rev. M. J. Berkeley (1875).

FUNGIA, n. *fŭn’jĭ-a* [L. *fungus*, a mushroom, from a resemblance to a fungus or mushroom]: genus of corals, typical of *Fungidæ*, sub-tribe *Aporosa*.

FUNGIBLES, *fŭn’jĭ-blz*, in Roman Law: movable articles which, in fulfilling contracts or returning loans, could be paid or returned by articles equivalent. The contract of loan was divided into *mutuum* and *commodatum*, a division which has been adopted by the law of Scotland, and by most of the European continental systems founded on the civil law. The former (*mutuum*) had reference to objects which admitted of being estimated by weight, measure, or number, or which could not be used without being given away or consumed; e.g., money, grain, wine, oil, and the like, which could be used only by him who possessed the full right of ownership, and consequently the contract of *mutuum* transferred the ownership to the borrower, who became bound to return not the object borrowed, but its equivalent. Objects of this nature were called fungibles, as distinguished from those transferred to the borrower, (on contract of *commodatum*) on condition that he should return the same individual objects to the lender.

FUNGINE, n. *fŭn’jĭn*: in *chem.*, metacellulose; variety of cellulose found in fungi and lichens.

FUNGUS, n. *fŭng’gŭs*, **FUNGI**, n. plu. *fŭn’jĭ*, sometimes **FUNGUSES**, n. plu. *fŭng’gŭs-ĕs* [L. *fungus*, a mushroom or toadstool: It. *fungo*: F. *fongus*]: a mushroom or toadstool; a cryptogamic plant not containing chlorophyl; any spongy excrescence on a plant or animal: see **FUNGUS**, in Pathology and Surgery (below). **FUNGI**, n. plu. *fŭn’jĭ*, an order of plants (see below). **FUN’GAL**, n. *-gŭl*, a fungus. **FUNGAL**, n. *fŭng-gŭl’ĕz*, an alliance of thallogens, corresponding to the old order *Fungi*. **FUNGOLOGIST**, n. *fŭng-gŭl’o-jĭst*, one skilled in fungology. **FUNGOL’OGY**, n. *-o-jĭ*, a treatise on fungi; the science of fungi; mycology. **FUNGOUS**, a. *fŭng’-gŭs*, of or resembling a fungus; soft; spongy. **FUNGOS’ITY**, n. *-gŭs’ĭ-tĭ*, soft excrescence. **FUNGIA**, n. *fŭn’jĭ-ă*, a mushroom-like genus of corals. **FUN’GIC**, a. *-jĭk*, denoting an acid obtained from mushrooms. **FUN’GIFORM**, a. *-fawrm* [L. *forma*, shape]: headed like a mushroom. **FUN’GITE**, n. *-jĭt*, a fossil fungiform coral. **FUNGIV’OROUS**, a. *-jĭv’ĕ-rŭs*

FUNGUS—FUNK.

[*L. voro*, I devour]: feeding on mushrooms **FUNGOID**, a. *fūng'goyd* [Gr. *eidos*, likeness]: resembling a mushroom.

FUN'GUS, in Pathology and Surgery: term with several significations. Thus any excrescence from a surface of skin or mucous membrane, or even from deeper parts, is sometimes called F., especially if it have a soft mushroom-like character, and a broad short pedicle. When the pedicle is long and narrow, it is called polypus (q.v.). The growths to which chiefly the term F. is applied are those which have the characters of cancer (q.v.); especially *fungus hæmatodes*, a very dangerous variety. But F. has yet another application in pathology, to those minute incrustations and alterations of the skin dependant on the growth of vegetable parasites, as Favus, Ringworm (q.v.), etc.

FUNICLE, n. *fū'nī-kl* [*L. fūnicŭlus*, a slender rope—from *fūnis*, a cord: It. *funicolo*: F. *funicule*]: in bot., a cord-like appendage by which, in many cases, the seeds are attached. **FUNICULAR**, a. *fū-nīk'ŭ-lēr*, consisting of a funicle. **FUNICULATE**, a. *-lāt*, in zool., having a narrow ridge like a string. **FUNIFORM**, a. *fū'nī-fawrm* [*L. forma*, shape]: resembling a cord or cable. **FUNICULAR CURVE**, curve in which a perfectly flexible string hangs when supported at the two extremities. **FUNICULAR POLYGON**, the figure assumed by a string supported at its extremities, and acted on by several forces.

FUNK, n. *fūngk* [prov. F. *fun*, smoke: Wall. *funki*, to smoke]: a strong rank smell, as that of tobacco; perturbation manifested by smell; fright; dudgeon: V. to fear; to be in a fright. **FUNK'ING**, imp. **FUNKED**, pp. *fūngkt*.

FUNK—FUNSTON.

FUNK, ISAAC KAUFMANN, D.D., LL.D.: American clergyman: 1839, Sept. 10— — — — —; b. Clifton, O. He was educated at Wittenberg College, Springfield, O., whence he graduated (1860), and entered on active work in the Lutheran church near Moreshill, Ind., 1861. Subsequently he held a pastoral charge at Carey, O., and later at St. Matthew's English Luth. Church, in Brooklyn, N. Y. In 1872 he resigned his pastorate to travel in Europe, Egypt, and the Holy Land. On his return he applied himself to journalism and publishing. In 1876 he founded the *Metropolitan Pulpit*, now known as the *Homiletic Review*, and was its editor-in-chief. In 1880, together with his partner and former college mate, A. W. Wagnalls, Dr. F. started the publication of a series of standard books which became very popular, and in 1884 issued Spurgeon's *Treasury of David*. About this time he started *The Voice* as a campaign paper in the interests of prohibition, and in 1885 made it a permanent publication. Together with his partner, Dr. F. published a number of important books, the chief of which was the *Standard Dictionary*, and the *Jewish Cyclopædia*.

FUNNEL, n. fŭn'nĕl [W. *fŷynel*, an air-hole: Bret. *Jou-nil* or *founil*, a funnel for pouring in liquids: L. *infundibŭlŭm*, that which serves for pouring in, a funnel—from *in*, *fundo*, I pour]: conical vessel open at both ends, terminating in a tube, and used for pouring liquids into narrow-mouthed vessels, and in laboratories for filtering: see **FILTER**. For common purposes, they are made of tin-plate or copper; but for corrosive liquids, they are of glass or earthenware; also the hollow or shaft of a chimney through which smoke ascends—from its resemblance to a funnel for pouring; in *steam-vessels*, the iron tube designed to convey away above the deck the smoke and gases set at liberty during the combustion of fuel in the boiler-flues, and also, from its height, to afford a sufficient draught to the furnaces. In large ships, the funnel is of great size; and in men-of-war, usually telescopic, so that, by simple mechanism, it may be withdrawn during an action from the chance of injury by cannon-shot.

FUNNY, a. fŭn'nĭ: see **FUN**. **FUN'NY-BONE**, the part of the elbow over which the ulnar nerve passes, which when struck or pressed sharply, causes a sensation not unlike an electric shock to pass down the arm.

FUNSTON, FREDERICK: an American military officer; b. 1865, Nov. 9; was educated at the Kansas State University. In 1896-97 he fought with the Cubans against Spain. When the American-Spanish war began he was made colonel of the 20th Kansas Volunteers, and accompanied them to the Philippines. On 1899, March 13, he was promoted brig.-gen. of volunteers in reward for his fearless feat of swimming across the Rio Grande at Calumpit under a galling fire and fixing a rope ferry by which the Americans crossed the river and routed the insurgents. His main service, however, was the capture of Aguinaldo, 1902, March 23, at his hiding place in Palanon, Isabella Province, Luzon, for which, a week later, he was made a brig.-gen. U. S. A. In 1902 he commanded the Dept. of the Colorado.

FUR.

FUR, n. *fēr* [a contr. of *fodder*, used in the double sense of food, and a case of lining: OF *forre*, a sheath, a case: Goth. *fodr*, a sheath, lining: Icel. *fodr*: Dut. *voeder*, fodder, a lining: Sp. *ferro*, lining]: the soft hair of certain animals growing thick on the skin; the skin and hair when prepared; any coating considered as resembling fur, as morbid matter on the tongue, the down on a peach, etc.; calcareous incrustation in a boiler or a kettle gradually formed from the boiling water. Many spring waters contain carbonate of lime held in solution by carbonic acid: when this water is boiled, the acid is expelled, and the carbonate is deposited, often in association with a little sulphate, forming a lining more or less coherent upon the sides of the vessel. In steam-boilers, this may be prevented by the addition of a small quantity of sal-ammoniac (hydrochlorate of ammonia) to the water; double decomposition takes place, carbonate of ammonia being formed and volatilized, while chloride of calcium remains in solution. **FUR**, a. made of fur: V. to line or ornament with fur; to cover with morbid matter, as the tongue. **FURRING**, imp. *fēr'ing*, covering with fur: N. in *arch.*, small slips nailed on joists or rafters to fill in deficiencies, and make the boarding lying on them level. **FURRED**, pp. *fēr'd*: **ADJ.** covered or ornamented with fur. **FURRIER**, *-rī-ēr*, a dealer in furs. **FURRY**, a. *fēr'ī*, covered with fur; consisting of fur. **FURRIERY**, n. *fūr-rī-ēr-ī*, furs in general; the trade in furs. **FURS**, in *her.* (see below).

FUR: soft hair growing on the skins of certain animals. Fur has been used in Europe as clothing for many centuries. Since European countries however have become more and more cleared and inhabited, fur bearing animals have become scarce and the supply is now obtained chiefly from other regions, especially N. America.

For the chief fur-bearing animals, see their respective titles.—*Ermine* fur is pure white, except the tip of the tail, which is black. The spotted appearance of this fur is not natural; it is produced by sewing the black tail-tips on the white fur at certain spots.—*Stoat* fur is a kind of inferior ermine.—*Sable* fur, obtained chiefly from n. Russia and Siberia, is valued in proportion to the darkness of its color.—*Marten* fur, especially that of rich dark-brown olive color, is much sought for.—*Fiery fox* fur, brought chiefly from the n.e. part of Asia, is admired both for its brilliant fiery color and for its fineness.—*Red-ox* fur, differing in some particulars from that of the fiery-fox, is sought after by the Chinese for trimmings, linings, and robes.—*Silver-fox* fur has a peculiar lustrous silver-gray color.—*Nutria* fur, belonging to the animal called the *coypou*, is brought largely from S. America, chiefly as a cheap substitute for beaver.—*Sea-otter* fur has been known in Europe about a century and a half, being obtained from the otters which frequent the seas washing the Asiatic shores of the Russian dominions; it varies from a beautiful brown to jet-black, and is very fine, soft, and glossy.—*Seal* fur is obtained from the seals frequenting various coasts, chiefly in the



Furbelows (time of William and Mary).



Furze.



Seedling Furze: *a*, Cotyledons; *b*, First pair of leaves, ternate; *c*, Succeeding leaves, simple.



Common Furze (*Ulex Europæus*).

FUR.

Northern and Southern Oceans.—*Beaver* fur was formerly much in request for the manufacture of hats; but the growing scarcity of the animal, and the substitution of silk hats for beaver hats, has lessened its importance.—The fur of various other animals is similarly valued, either for warmth or beauty; such as that of the *bear*, *raccoon*, *badger*, *minx*, *lynx*, *musquash*, or *musk-rat*, *rabbit*, *hare*, *squirrel*, and *chinchilla*.

For manufacturing purposes, furs are classified into *felted* and *dressed*. Felted furs, such as beaver, nutria, hare, and rabbit, are used for hats and other felted fabrics, in which the hairs or filaments are made so to interlace or entangle as to form a very strong and close plexus. The quality of the fur is better when the skin is taken from the animal in winter than in any other season, giving rise to the distinction between 'seasoned' and 'unseasoned' skins. The removal of the fur from the pelt is a necessary preliminary to the preparation of fur for felting purposes. In many kinds of skin, such as that of the hare, the fur is of two kinds—a close short layer of felting fur next the pelt, and longer outer hairs of unfelting fur. The removal of these two is effected separately. The long hairs are cut off by a kind of shears; and the true fur is then removed by the action of a knife; bearing some resemblance to a cheese-cutter, requiring much care in its management. In some sorts of skin, the long hairs are removed by pulling instead of shearing; in others, the greasiness of the pelt renders necessary a cleansing process with soap and boiling water before the shearing; and in others, both pelt and fur are so full of grease as to require many repetitions of cleansing. For beaver skins, a machine of very beautiful construction is employed in cutting the fur from the pelt. When the coarse hairs have been removed to form a stuffing for cushions, the skin is placed in a machine containing a broad keen blade equal in length to the width of the skin. This blade has a peculiar reciprocating movement given to it, producing a kind of chopping effect on any substance to which it is applied, by coming nearly in contact with another blade placed parallel with it. The skin is guided between rollers into the space between the two blades; and then the action of the upper blade crops off the fur from the pelt in a very complete manner—every particle being removed, and yet the pelt is not cut. The fur falls upon an endless apron, which carries it to a chest, or trunk, containing a blowing-machine; this machine separates the fur into three or four qualities, by blowing to the furthest distance the lightest and most valuable filaments, leaving the heavier and coarser to be deposited sooner. Furs have their felting property sometimes increased by the process of *carroting*, in which the action of heat is combined with that of sulphuric acid. For the chief employment of felted furs, see HAT MANUFACTURE.

Dressed furs are those to which the art of the *furrier* is applied for making muffs, boas, and fur-trimmings to garments. The fur is not separated from the pelt for these purposes; the two are used together; and the pelt is con-

FUR.

verted into a kind of leather to fit it for being so employed. The fur-hunters always exercise great care in drying the skins after removing them from the animals, seeing that any putrefactive action would ruin the fur. Before furs are made up, the skins undergo cleansing processes: They are steeped and scoured in a bath of bran, alum, and salt, to remove greasiness from the pelt; then in a bath of soap and soda, to remove oiliness from the fur. When thoroughly washed and dried, it is found that the pelt, by the action of the alum, has been converted into a kind of *tawed* or kid leather. The cleansed and dried skins are made into garments and trimmings by sewing through the pelt. The skins, however, are very irregular in shape and often differ much in color in different parts; they require to be cut up into pieces, matched according to tint, and sewn together edge to edge. This requires much skill, especially where the furs are valuable. A fur garment or trimming, appearing to the eye as if it were one uniform piece, is thus generally made up of many curiously shaped pieces. The shaping for use, and the lining with silk and other materials, call for no description.—The great source of furs is the Hudson's Bay Territory (q. v.).

In the United States the chief fur-bearing animals are the beaver, pine and stone martens, mink, lynx, badger, raccoon, silver, white, cross, blue, and red fox, seal, sea ouser, Va. opossum, muskrat, bison, grizzly, and black bear, and gray wolf. The fur industry has been an important and growing one almost from the discovery of the continent. Early settlers traded with the Indians, several great trading companies were organized, and the Dutch East India Company had fur-trading posts at New York, Albany, on the Delaware river, and along the coast of Me. 1609–1684. The accession of the French to Canada led to a vast increase in the industry, to the erection of numerous forts and trading houses, and to the extension of operations from Hudson Bay to New Orleans. On the acquisition of the vast northern hunting grounds by the British, the Hudson's Bay Company secured a monopoly of the hunting, trading, and selling, and held it without much competition till 1799, when the Northwest Company became a rival, the American Fur Company was established 1808 by John Jacob Astor, who proposed making his headquarters at the mouth of the Columbia river and exporting his furs direct to China and India. In 1813 his company, whose name had been changed to the Pacific Fur Company, was sold out by his resident partner to the Northwest Company, and his subsequent operations were confined to the region e. of the Rocky mountains, with chief trading port at Mackinaw. In 1808 Auguste and Pierre Chouteau—who had been connected with the great fur depot of Laclede, Maxon & Co. established in St. Louis, 1763—formed the Missouri Fur Company, and operated it till its dissolution during the war with England 1812–15. The Rocky Mountain Fur Company was established at St. Louis, 1827. and the firm of Pierre Chouteau, Jr., & Co., 1834. These two corporations employed the greater part of the American trappers and

FURBELOW.

hunters between the Miss. river, the great lakes, and the Pacific ocean for many years. The backbone of the great monopoly in the industry was broken when the charter and license of the consolidated Northwest and Hudson's Bay companies expired, 1859. The Russian-American Fur Company carried on an enormous business in seals in Alaska till its property and rights together with the territory were purchased by the U. S. govt, 1867; and since 1870 the seal fisheries of that locality have been entirely in the control of the Alaska Commercial Company of San Francisco, which operates under a contract with the general govt. by which the number of seals to be taken annually is limited to 100,000, and they males only. Large numbers of small fur-bearing animals are killed annually and their pelts are used for patching more valuable ones. Counterfeiting valuable skins is very common in all countries, by mechanical treatment of the fur itself, dyeing, etc.; but an expert furrier can always detect imposition. In purchasing valuable furs it is far better to deal with a reputable merchant and pay an apparently high price than to be satisfied with a low-priced imposition. The catch of the chief fur bearing animals, as well as the choice of fashion and cost of skins varies with the seasons; but the subjoined table gives a fair estimate of the most popular animals, the uses made of their skins, the number collected annually, and the market value of the dressed pelt.

Animal.	Uses of Pelt.	Average Annual Collection	Value dressed Pelts.
Badger.....	Robes, military trappings.	5,000	\$.50-1.00
Bear, Black.....	caps, mats	15,000	20.-40.
" Brown.....	Muffs, ladies' trimmings..	15,000	60.
Beaver.....	Great variety.....	200,000	1.- 5.
Buffalo.....	Lap-robcs.....	100,000	3.-10.
Ermine (Alaska)...	Royal state robes	1,500	1.- 3.
Fisher (Marten)...	Linings, trimmings, robes.	12,000	10.-20.
Fox, Silver.....	Muffs, boas, trimmings....	1,000-2,000	50.-300.
" Cross.....	Lap-robcs, trimmings....	10,000	10.
" White.....	" "	6,000	2.50-5.
" Gray.....	Mats, muffs, trimmings....	25,000	1.-10.
" Kitt.....	" "	40,000	1.- 4.
" Red.....	Trimmings, linings....	300,000	1.- 5.
" Blue	" "	6,000-7,000	10 -20.
" Black (rare)..	Muffs, boas, trimmings....	400.-1000.
Lynx.....	Cloak facings, linings.....	20,000	3.- 5.
Marten, Pine.....	Coats, sacques	200,000	25.
" Stone	Muffs, boas, trimmings....	150,000	1.- 5.
Mink.....	" collars.....	250,000	3.- 8.
Muskrat.....	Manufacture of hats.....	3,000,000	.50-1.50.
Opossum... ..	Mats, trimmings, caps....	250,000	.05- .50.
Otter, Land.....	{ Coats, Chinese and {		10.-18.
" Sea.....	" Russian Nobles.... }	4,000	50.-400.
Raccoon	Coat linings, mfr. of hats.	500,000	.50- 8.
Seal, Fur.....	Coats, sacques, caps, gloves	100,000	30.-45.
Skunk.....	Trimmings, muffs, boas...	600,000	.50- 3.

FURBELOW, n. *fēr'bě-lō* [F. and Sp. *falbala*; Sp. *farfala*, a flounce: prov. F. *friboler*, to flutter: It. *farfalla*, a butterfly, from its fluttering flight—*lit.*, something that

flaps to and fro]: padding; a puckered flounce for ornamenting various parts of the female dress.

FURBISH, v. *fer'bîsh* [F. *fourbir*, to furbish; *fourbisant*, furbishing; It. *forbire*, to burnish]: to rub or scour to brightness; to polish. FUR'BISHING, imp. FUR'BISHED, pp. -*bisht*. FUR'BISHER, n. one who.

FURCATE, a. *fēr'kāt*, or FUR'CATED, a. -*kā-tēd* [L. *furcatus*—from *furca*, a fork]: forked; branching like the prongs of a fork. FURCA'TION, n. -*kā'shūn*, a branching like a fork.

FURCULUM, n. *fēr'kū-lām*, or FUR'CU'LA, n. -*lā* [L. dim. of *furca*, a fork]: a forked or V-shaped bone in the breast of a fowl, formed of the united clavicles; the merry-thought: see FOURCHETTE.

FURFUR, n. *fēr'fēr* [L. *furfūr*, bran; It. *forfora*], scales like bran; dandruff; scurf. FUR'FURA'CEOUS, a. -*ā'shūs* [L. *furfuraceus*], scurfy or scaly; covered with a meal-like powder. FUR'FURA'TION, n. *ā'shūn*, the state of suffering from scurf or scalliness of the skin. FURFUR'AMIDE, n. -*ā-mīd* [*furfuro*l, and *amide*], solid combustible substance obtained from furfuro^l. FURFURINE, n. *fēr'fū-rīn*, an isomeride of furfuro^l. FURFUROL, n. *fēr'fū-rōl* [L. *oleūm*, oil]: volatile aromatic oil obtained from wheaten bran, also from sugar, starch, etc., by means of diluted sulphuric acid. When starch, sugar, or bran is acted on by dilute sulphuric acid and peroxide of manganese, the distillate contains not only Formic Acid (q.v.), but a small quantity of an essential oil, which, after being purified by redistillation, is colorless, has a fragrant odor somewhat resembling that of bitter almonds, and when dissolved in cold sulphuric acid, forms a beautiful purple liquid. This oil is *Furfuro*l and its composition is represented by the formula $C_5H_4O_2$. —If furfuro^l be treated with ammonia, it is converted into *Furfuramide* ($C_{15}H_{12}N_2O_3$), which occurs in colorless crystals, insoluble in water, but soluble in alcohol, and perfectly neutral. If furfuramide is boiled with a solution of potash, it dissolves, its elements assume a new arrangement, and the solution on cooling deposits long silky needles of a powerfully alkaline base, *Furfurine*, which is isomeric with furfuramide. It is dissolved by dilute acids, and completely neutralizes them; and on adding ammonia to these solutions, the alkaloid is precipitated unchanged. It was discovered by the late Prof. Fownes; and as the first vegeto-alkali artificially formed, its production was regarded as a great step in organic chemistry.

FURIDPUR, *fūr-ēd-pôr'*, or DACCA JELALPUR, *dā'kā-jēl-al-pôr'*: district of Bengal Proper, n. lat. between $23^{\circ} 3'$ and $24^{\circ} 5'$ and e. long. between $89^{\circ} 30'$ and $90^{\circ} 15'$; 2,267 sq. in. It is everywhere intersected by branches or feeders of the Ganges, which, as the surface barely rises above the level of the sea, are all, unless in the dry season, navigable. The soil is in general rich. Pop. about 1,500,000.

FURIDPUR: town of Bengal Proper, cap. of the dist. of F.; on the right bank of the Ganges, here called the

FURIES—FURNEAUX.

Podda; lat. 23° 36' n., and long. 89° 50' e. It is 115 m. n.e. of Calcutta. Excepting the public establishments, which it possesses as cap. of the dist., the place is mainly a scattered series of native villages; and, in fact, it is notable chiefly as having at one time been a nest of river-pirates. Pop. about 8,600.

FU'RIES: see EUMENIDES.

FURIOUS, a *fū'ri-ūs* [F. *furieux*—from L. *furiosus*, mad, raging—from *furia*, the three furies, rage: It. *furioso*]: impetuous; raging; transported by passion beyond reason. FURIOUSLY, ad. *-lī* FU'RIOUSNESS, n. madness; rage. FURY, n. *fū'ri* [F. *furie*—from L. *furia*, rage, fury]: rage; madness; impetuosity; a turbulent violent woman. FU'RIES, n. plu. *-rīz*, in *heathen myth.*, the three avenging female deities (see EUMENIDES). FU'RIO SO, ad. *-rī-ō'sō* [It.]: in *music*, furiously; vehemently. FURIOSANT, a. *-ōs'ant*, in *her.*, applied to a bull or other animal when represented in a rage; called also RANGANT. FU'ROR, n. *-rōr* [L.]: rage; fury.—SYN. of 'furious': violent; vehement; boisterous; fierce; turbulent; angry; mad; tumultuous; frenzied; frantic;—of 'fury': rage; anger; wrath; resentment; ire; madness; frenzy; turbulence; indignation; vehemence; violence; fierceness; a hag; a virago: a termagant.

FURL, v. *fēr'l* [OF. *fardeler*, to truss or pack up]: to roll up in a long bundle, as a sail or flag; to draw up. FUR'LING, imp. FURLED, pp. *fērld*.

FURLONG, n. *fēr'lōng* [contr. from *furrowlong*, the length of a furrow]: a measure of length, being the eighth part of a mile, equals 220 yds. (see YARD).

FURLOUGH, n. *fēr'lō* [Dut. *verlof*; Dan. *forlov*, leave, permission]: among *mil. men*, leave of absence from duty: non-commissioned officers and private soldiers on furlough must be provided with a pass, else they are liable to be seized as deserters: V. to grant leave of absence. FUR'LOUGHING, imp. FUR'LOUGHED, pp. *-lōd*, having a furlough.

FURMER, n. *fēr-mer*: a flat chisel.

FURMITY, n. *fēr'mī-tī*, or FURMENTY, n. *fēr'měn-tī*, and FRU'MENTY, n. [see FRUMENTACEOUS]: a kind of potage or gruel made from wheat, and flavored.

FURNACE, n. *fēr'nās* [F. *fournaise*; OF. *fornaise*, a furnace, an oven—from L. *fornācem*, an oven, a kiln—from *furnus*, an oven: It. *fornace*]: an inclosed fireplace for obtaining a high degree of heat, used for heating houses, and on a great scale in the manipulation of metals and liquids in the arts: see IRON: GLASS: LEAD: FORGE: etc.; *figuratively*, grievous afflictions: V. to throw out sparks as from a furnace. FUR'NACING, imp. FUR'NACED, pp. *-nāst*.

FURNARIUS, n. *fēr-nār'ī-ūs* [L. a baker]: in *ornith.*, typical genus of *Furnariæ*, a sub-family of *Certhidæ* (Creepers); small birds found in S. America and the W. Indies.

FURNEAUX, *fēr-nō'*: group of islands in Bass's Strait

FURNES—FURNISH.

between Australia and Tasmania; named from an English navigator, second in command on Cook's second voyage. Flinders Island, the principal one, is 46 m. long by 10 broad.

FURNES, *fürn*: small town of Belgium, in w. Flanders, 27 m. w.s.w. of Bruges, where four important lines of canal meet. The town-house is a fine Gothic structure. F. trades in linen, cattle, hops, and cheese. Pop. 5,000.

FURNESS, *fēr'nēs*: district in the n.w. of Lancashire, England, forming a peninsula between Morecambe Bay and the Irish Sea. The chief town is Barrow-in-F. (q.v.). —The ruin of F. ABBEY is in a beautiful glen two m. from Barrow, and is one of the finest examples of the transition Norman and Early English architecture in England. Founded 1127 for the Benedictines, it afterward became a Cistercian house. It was long one of the wealthiest abbeys in the kingdom. The civil jurisdiction of the princely abbots of F. extended beyond the limits of the district of Furness.

FURNESS, *fēr'nēs*, HORACE HOWARD: author: b. Philadelphia, 1833, Nov. 2; son of William Henry F., D.D. He graduated at Harvard Univ. 1854, spent three years in European travel, and was admitted to the bar in Philadelphia 1859. He has since become one of the most accomplished Shakespearean scholars in the United States, and has given years of labor to editing a variorum edition of Shakespeare's works, of which six volumes were published 1871-88.

FURNESS, WILLIAM HENRY, D.D.: Unitarian minister and author: b. Boston, 1802, Apr. 20. He graduated at Harvard College 1820, studied theol. at the Cambridge Divinity School, and was pastor of the First Congl. Unit. Church, Philadelphia, 1825, Jan.—1875, when he retired from pastoral labor. He edited *The Diadem*, an annual, 1845-47, received the degree D.D. from Harvard College 1847, and that of doctor of letters from Columbia College 1887. He translated Schenkel's *Das Characterbild Jesu*, and Schiller's *Song of the Bell*, the latter being generally accepted as the best English version ever produced; and published *Remarks on the Four Gospels* (1835); *Jesus and His Biographers* (1838); *Domestic Worship*, prayers (1842); *A History of Jesus* (1850); *Thoughts on the Life and Character of Jesus of Nazareth* (1859); *The Veil partly Lifted and Jesus becoming Visible* (1864); *The Unconscious Truth of the Four Gospels* (1868); *Jesus* (1871); *The Power of Spirit Manifest in Jesus of Nazareth* (1877) *The Story of the Resurrection Told Once More* (1885); and *Verses, Translations, and Hymns* (1886). He d. 1896, Jan. 30.

FURNIMENT, n. *fēr'nī-měnt* [F. *fourniment*—from It. *fornimento*]: in *OE.*, furniture.

FURNISH, v. *fēr'nīsh* [F. *fournir*, to furnish; *fournissant*, furnishing: It. *fornire*, to store with: OH. Ger. *frumjan*, to provide, to procure—from *fruma*, profit, gain]: to supply with anything wanted or necessary; to fit up; to store. **FUR'NISHING**, imp.: ADJ. supplying furniture, etc. **FUR'NISHED**, pp. *-nīst*, supplied; in *her.*, applied to a

horse bridled, saddled and completely caparisoned. **FURNISHER**, n. one who. **FURNITURE**, n. -nĭ-tŭr or -nĭ-chŭr [*F. furniture*]: the necessary movables of a house; equipage; decoration; in *OE.*, supply.—**SYN.** of 'furnish': to supply; equip; provide; afford; fit out.

FURNITURE: an organ-stop or register, consisting of two or more ranks of pipes to each note, all of higher pitch than the 15th stop.

FURNITURE, HOUSEHOLD, HIRING OF: an arrangement not very frequent in the United States, excepting where premises are leased furnished, and then the amount of the leasehold proper is increased to secure a reasonable percentage for the use of the furniture. At the expiration of the lease both domicile and contents must be surrendered in as good condition as when taken, with allowance for ordinary depreciation by wear and tear. Whether the furniture is included in the lease of the premises, or is obtained by other means such as gift to or purchase by the tenant, the owner of the premises has a claim against it as long as it remains in the premises, and may seize and hold it to exact payment of rent. And the law has been so construed in some cases as to give the landlord a lien upon the furniture in his leased premises even if owned by a third party, as his claim relates to the place where the furniture is used and not to its owner, in the same way that a mortgage covers a specified piece of property and lies against it irrespective of how many times it may be transferred. The law of liens differs greatly in various states. In some a judgment becomes a lien on personal property, in others on real property, in others again on both; while the length of time such a lien can be maintained varies from a month upward. In some places, too, the tools of a workman are regarded the same as furniture, and may be similarly distrained. All the states have enacted liberal laws exempting certain kinds and amounts of personal property from attachment or levy and sale on execution, in which a varying amount of furniture, working teams, tools, wearing apparel, dwellings, barns, workshops, and numerous other articles are included; but these exemptions should not be cited in cases of distraintment for rent as they are governed by other statutes, generally known as landlord and tenant acts. See **DEBTOR AND CREDITOR, LAWS OF: DEBTS, RECOVERY OF: SMALL DEBTS.**

FURNIVALL, fĕr'nĭ-val, **FREDERICK JAMES**: b. 1825, Feb. 4, at Egham, Surrey, England: laborious and enthusiastic student of early English. He was educated at University College, London, and Trinity Hall, Cambridge, where he took his degree 1846. In early life he associated himself in philanthropic work with Frederick D. Maurice, and taught in his Working Men's College every term for ten years. He has devoted himself to English philology, and with characteristic energy has founded, for the publication of texts, 'The Early English Text Society,' 1864 (with the 'Extra Series' 1867); 'The Chaucer Society' (1868); 'The Ballad Society' (1868); and the 'New Shake-

FUROLE—FURRÛCKABAD.

speare Society' (1874); and more recently has been active in starting 'The Browning Society' (1881), and 'The Wiclif Society' (1882). He has been honorary sec. of the Philological Soc. since 1854, and he edited for some years the Society's great English Dictionary, the first part of which was published under the supervision of Dr. Murray 1884. Through his societies, he has raised and expended more than £20,000 in printing early mss. and rare books, and has thus placed in the hands of thousands of students cheap and accurate texts. He has personally edited many works, chiefly through the medium of some one of the above societies; the most important being *Saint Graal*, the History of the Holy Grail, in English verse, by Henry Lonelich (1440), with its original, the Old French prose *Histoire del Saint Graal* (2 vols. 1861-63); Roberde of Brunne's *Handlyng Synne* (1862); Walter Map's *Queste del Saint Graal* (1864); *Political, Religious, and Love Poems* (1866); Bp. Percy's *Folio MS. of Ballads and Romances*, ed. jointly with J. W. Hales (3 vols. 1867-8); *Ballads from Manuscripts on the Condition of Tudor England, 1520-50* (2 vols. 1868-72); Caxton's *Book of Curteseye* (1868). His most valuable work, has been his splendid edition of Chaucer's *Canterbury Tales*: 'A Six-Text Print of Chaucer's Canterbury Tales' (7 parts (1868-75), an exact reprint of six of the seven most important mss. (the seventh having already been edited by Dr. Morris). This work has given a new impulse to English scholarship, and will always remain a monument of the noble and patient enthusiasm of its editor. For Chaucer scholars he has edited further a 'Parallel Edition of Chaucer's Minor Poems,' and a 'Parallel Text Edition of Chaucer's *Troilus and Creseyde*.'

FUROLE, n. *fû-rôl'* [F.]: meteoric light sometimes seen on the sail-yards of ships at night.

FUROR: see under **FURIOUS**.

FURRED, **FURRIER**, etc.: see under **FUR**.

FURROW, n. *für'rô* [AS. *furh*; Ger. *furche*, a furrow: comp. L. *porca*, a ridge between two furrows]: the small trench or channel made by a plow; any narrow groove or channel; a wrinkle: V. to form furrows in; to groove; to wrinkle. **FUR'ROWING**, imp. **FUR'ROWED**, pp. *-rôd*, having channels or ridges lengthwise.

FURRÛCKABAD, *für-rûk-a-bâd'*: district in the N.W. Provinces of India; consisting for the most part of an irregular strip of country in the middle Doab. Its 1,718 sq. m. are densely populated. The ruins of Kanauj, cap. of a powerful Hindu kingdom, are still to be seen within its boundaries. The commercial crops are principally cotton, tobacco, and indigo. Pop. over 900,000.

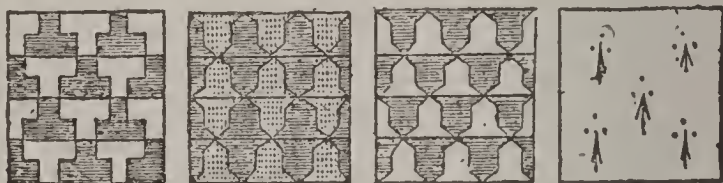
FURRUCKABAD (Happy Residence): city of the Doab (q.v.), near the right bank of the Ganges; cap. of the dist. of F.; lat. 27° 24' n., and long. 79° 40' e. It is a handsome, cleanly, and healthy place, 570 ft above the level of the sea, with considerable trade. Independently of its position on the grand artery of the country, F. is within 20 m. of the great route between Calcutta and Delhi. Here Lord

Lake defeated the troops of Holkar 1805. Pop. (1891) 78,180.

FURRY: see under FÜR.

FURS, in Heraldry: various furs used in coat-armor, as well as in trimming and lining the robes of knights and nobles, and the mantles represented as surrounding their shields. This use arose from the fact that shields were often covered with the skins of wild animals, on which the fur was left. The principal heraldic furs are—1. Ermine of which the field is white, and the spots black; 2. Ermines of which the field is black, and the spots white; 3. Erminois, which has the field gold, with black spots; 4. Vair, which consisted of pieces of the shape of little glass pot (Fr. *verres*, of which the word is a corrupt spelling). It is said that the furriers used such glasses to whiten furs in, and because they were commonly of an azure (blue) color, the fur in question come to be blazoned *argent* and *azure*; while counter-vair, in which the cups are represented as placed base against base, in place of edge to base,

FURS.



Potent. Counter-vair. Vair. Ermine.

as in vair was *or* and *azure*. 5. Potent and counter-potent, which are supposed to resemble the heads of crutches, placed differently, but having the same tinctures—viz., *azure* and *argent*.

FÜRST, *fürst*, JULIUS: orientalist: 1805, May 12—1873; b. Zerkowa, in the grand-duchy of Posen, Prussia, where his father, a Jew, was lecturer on circumcision in the synagogue. F. was educated for the rabbinical profession, and very early showed remarkable power of acquiring knowledge. He studied at Berlin, where the German philosophy made sad havoc of his previous convictions. The conflict in his mind between science and rabbinical lore ended, 1829, in the defeat of the latter, and F. immediately went to Breslau, where he continued his oriental, theological, and antiquarian studies, which were completed at Halle 1831, under Gesenius, Wegscheider, and Tholuck. In 1833 he went to Leipsic, where he became prof. in the univ. 1864. Among his numerous and valuable writings are *Lehrgebäude der Aramäischen Idiome* (System of Aramaic Idioms, Leip. 1835), a work which brought the Semitic languages within the sphere of comparative grammar, then in its infancy; and which, besides, sought to establish a system of analytico-historic investigation in regard to these languages themselves; *Perlenschnüre Aramäischer Gnomén und Lieder* (Pearl-strings of Aramaic Gnomes and Songs, Leip. 1836), with elucidations and glossary;

FÜRSTENWALDE—FURTHER.

Concordantie Librorum Sacrorum Veteris Testamenti Hebraice et Chaldaice (Concordances of the Sacred Books of the Old Testament in Hebrew and Chaldee, Leip. 1837-40), a work of indefatigable industry and careful research, which has obtained for its author great reputation in Germany and other countries; *Ari Nohem* (Leip. 1840), polemical treatise on the genuineness of the Solah and the worth of the Cabbala; *Die Sprüche der Väter* (The Sayings of the Fathers, Leip. 1839); *Die Israelitische Bibel* (The Hebrew Bible, Berlin 1838), translated into German from the original, by himself in conjunction with other scholars; *Der Orient; Berichte, Studien und Kritiken für Jüdische Geschichte und Literatur* (The East; Notices, Studies, and Criticisms in connection with Jewish History and Literature, Leip. 1840); *Die Jüdischen Religionsphilosophen des Mittelalters* (The Jewish Religious Philosophers of the Middle Ages, Leip. 1845); *Geschichte der Juden in Asien* (History of the Jews in Asia, Leip. 1849); *Bibliotheca Judaica* (1849-'53); *Hebräisches und Chaldäisches Handwörterbuch* (Hebrew and Chaldee Manual, Leip. 1851-54); and an edition of Winer's *Chaldee Reading Book* (1864).

FÜRSTENWALDE, *fürs'tén-vâl-dêh*: small walled town of Prussia, province of Brandenburg, on the right bank of the Spree, 30 m. e.s.e. of Berlin. It has a brick church of the 14th c., the *Marienkirch*, which contains a fine Gothic *Sacramentshäuschen* (or pyx for keeping the host), built of sandstone, dating 1510. F. manufactures linens and woollens, and has some trade by river. Pop. (1890) 12,775.

FÜRTH, *fürt*: flourishing manufacturing town of Bavaria, in Middle Franconia, at confluence of the Rednitz and the Pegnitz, about 5 m. n.w. of Nürnberg, with which it is connected by a railway laid out in 1835, the first completed in Germany. F. has numerous churches, synagogues, a town-hall, theatre, etc. It is the most industrious and most prosperous manufacturing town of Bavaria; its mirrors, chandeliers, snuff-boxes, lead-pencils, its brass and wood wares, and its articles of dress are famous. The making of metallic leaf, and the manufacture of articles in bronze, are most important branches of industry. F. produces also pinchbeck rings, watch-keys, brass nails, spectacles, and optical instruments in great abundance. An annual fair, lasting 14 days, takes place at Michaelmas. F. appears in history first about the beginning of the 10th c., when it belonged to the archbishops of Bamberg. Subsequently it acknowledged the authority of the Burgrafs of Nuremberg. In 1634, during the 'Thirty Years' War, the Austrian Croats burned it to the ground. In 1680 a great fire almost laid it in ashes again. It began to attain importance as a seat of manufactures in the latter half of the last century. Pop. (1900) 54,144, of whom 4,000 were Jews, the rest Protestants.

FURTHER, a. *fër'thër* [AS. *forth*, forward, onward; Dut. *voorder*; Ger. *vorder*, further, more onward (see FORTH); comp. O.H.G. *furdir*; Ger. *fürder*, onward]: more distant; beyond this; additional; is now used as the

FURTIVE—FURZE.

compar. of *far*, but erroneously: AD. to a greater distance: V. to help forward; to promote. FUR'THERING, imp. promoting; advancing. FUR'THERED, pp. *-thèrd*. FUR'THERANCE, n. *-thèr-àns*, a helping forward. FUR'THERMORE, ad. moreover; besides. FUR'THERMOST, a. most remote. FURTHEST, a. *fèr'thèst*, most advanced in time or place: AD. at the greatest distance. *Note.*—*farther* is restricted by many in its application to distance, and *further* to quantity and degree, etc. Skeat affirms that *further* is the comparative of AS. *fore*, before. It is a development of Dut. *voor*; Eng. *fore*—see Wedgwood under *forth*.

FURTIVE, a. *fèr'tiv* [F. *furtif*—from L. *furtivus*, stolen—from *fur*, a thief: It. *furtivo*]: stealthy, as furtive glances. FUR'TIVELY, ad. *-lì*, by stealth.

FURUNCULUS. n. *fèr-ùng'kù-lùs* [L. *furunculus*, a petty thief, a boil—from *fūr*, a thief]: a boil or small sore having a central core, and suppurating imperfectly. FURUNCULAR, a. *fèr-ùng'kù-lér*, like a furunculus.

FURY: see under FURIOUS.

FURY AND HEC'LA STRAIT: water-passage separating, in lat. 70° n., and long. from 82° to 86° w., Melville Peninsula on the s. from Coekburn Island on the n., and connecting Fox's Channel on the e. with the Gulf of Boothia on the w.; lat. 70° n., long. 82°–86° w. It is of no value as a means of communication, nor is ever likely to be so, its w. entrance having been ascertained by Captain Parry who discovered it on his second voyage, to be impenetrably closed from shore to shore by the accumulated ices of many years. It is traversed from w. to e. by a strong current, which passes down Fox's Channel into Hudson's Strait.

FURZE, n. *fèrz* [AS. *fyrz*, furze: properly *firs*, from the prickly leaves: comp. Gael. *preas*, a brier, a bush]: (*ulex*). FURZY, a. *fèr'zì*, full of furze.—*Furze* is a genus of plants of nat. ord. *Leguminosæ*, sub-ord. *Papilionaceæ*, distinguished by a two-leaved calyx with a small scale or bractea on each side at the base, stamens all united by their filaments, and a turgid pod scarcely longer than the calyx. The COMMON F. (*U. Europæus*), called also WHIN and GORSE, is a prickly shrub two or three ft. high, extremely branched; the branches green, striated, and terminating in spines; the leaves few and lanceolate; the flowers numerous, solitary, and yellow. It is common in many s. parts of Europe and in Britain, though it often suffers from severe winters; whereas in mild seasons its flowers may be seen all winter, so that there is an old proverb, 'Love is out of season when the furze is out of blossom.' It is scarcely known in n. parts of Europe; and Linnæus is said to have burst into exclamations of delight when he first saw a common covered with F. bushes glowing in the profusion of their rich golden flowers. F. is sometimes planted for hedges, but is not well suited for the purpose, occupying great breadth of ground, and not readily acquiring sufficient strength; besides, it does not, when cut, tend to acquire a denser habit. It is useful as affording winter

food for sheep, and on this account is burned down to the ground by sheep-farmers when its stems become too high and woody, so that a supply of green succulent shoots may be secured. In some parts of Wales, F., chopped and bruised, forms the principal part of the winter fodder of horses. In some places, it is sown to yield green food for sheep or other animals, but is preferable to other green crops only on dry sandy soils where they could not be advantageously cultivated. It is most extensively cultivated in Flanders. It is chopped and bruised by means of a mallet, one end of which is armed with knife-blades; or by means of a simple machine, called a gorse-mill.—A double-flowering variety is common in gardens. A very beautiful variety, called IRISH F., originally found in Ireland (*U. strictus* of some botanists), is remarkable for dense, compact, and erect branches. A dwarf kind of F. (*U. nanus*) occurs in some places, and is perhaps also a mere variety; if so, there is only one species known.

In fox-hunting countries, F. is encouraged on account of the excellent *cover* it affords. It is also a favorite cover for rabbits.

FU-SAN: seaport of Corea, province of Kyong'-Sang-do; lat. 35° 6' n., long. 129° 1' w.; on Broughton Strait, n.w. of the island of Tsu-Shima. It is the largest city on the Japan Sea coast of Corea s. of Won-San, on Broughton Bay. Near it are the cities of Chhang-won and Tong nai. It is in a mountainous region, chiefly watered by the Nak-tong river. Though in Corea it has been recognized as an important Japanese seaport for nearly 300 years, in which no Koreans resided. Occasionally Chinese merchants settled there and undertook trade with the natives in the interior, but the Japanese authorities expelled them on short notice, and it was not till the treaty of 1876 that the restrictions on foreigners in F. were removed. See COREA.

FUSANUS, n. *fūz'a-nūs* [mod. L.—from F. *fusain*, a spindle-tree] genus of *Santalaceæ* (Sandalworts). *F. acuminatus*, the Quandang Nut, is as agreeable to the Australians as the almonds are to us.

FUSARIUM, n. *fū-zār'ī-ūm*: genus of fungi. Some species are parasitic on rye and the mulberry.

FUSARO, *fō-sā'rō*, LAKE OF: small lake of s. Italy, province of Naples. 11 m. w. from Naples, on the peninsula of Baia. It is not far from the site of the anc. Cumæ, of which it is supposed to have been the port. Numerous remains of massive buildings, villas, and tombs are in the neighborhood. At the s. extremity of the lake is a canal of Roman construction, communicating with the sea, now known as the *Foce del Fusaro*. The water of the lake is brackish, more salt than fresh. The lake is famous for its oysters, cultivated here (see OYSTER) since the times of the ancient Romans. They are larger and of finer flavor than those of the Bay of Naples. The lake is supposed to be the crater of an extinct volcano; and, 1838, great quantities of noxious gases were emitted by which the oysters were killed. The lake of F. received from the ancients

FUSAROLE—FUSE.

the name *Acherusia Palus*, probably bestowed on it first by the Greeks of Cumæ, because of its proximity to Avernus, and its crater-like character. In later times of the Roman empire its banks were adorned with the villas of wealthy Romans.

FUSAROLE, or **FUSAROL**, n. *fūz'a-rōl* [L. *fusus*, a spindle; the shaft of a column]: in *architecture*, molding or ornament immediately under the echinus in the Doric, Ionic, and composite capitals; shaft of a column, pilaster or pillar, or that part between shaft and capital.

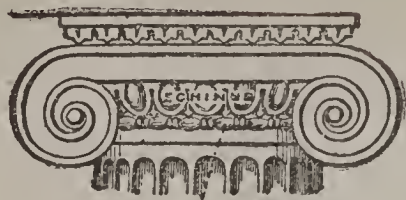
FUSCOUS, a. *fūs kūs* [L. *fuscus*, dark: It. *fosco*]: in *bot.*, dark; dusky; brown. **FUSCESCENT**, a. *fū-sēs-ēnt*, tending to a dark brown.

FUSE, v. *fūz* [L. *fūsus*, poured or spread out: It. *fuso*]: to melt or liquefy by heat; to be melted. **FUSING**, imp. (see **FUSING AND FREEZING POINTS**). **FUSED**, pp. a. *fūzd*, melted. **FUSION**, n. *fūzhūn*, the act of melting; the state of being dissolved or melted by heat; the union or blending together as if melted. **FUSIBLE**, a. *-zī-bl*, that may be melted. **FUSIBIL'ITY**, n. *-bīl'ī-tī*, the quality of being able to be melted. With few exceptions, all solids which can bear a high temperature without undergoing chemical change may be melted. Many substances popularly regarded as infusible, e.g. platinum and flint, readily fuse before the oxyhydrogen blow-pipe, or between the poles of a powerful galvanic battery; even carbon has been partially fused by the last-named means. There are many substances which cannot be melted because they are decomposed by the action of heat. Thus, wood and many other organic compounds are decomposed into certain gases, which escape, and into carbon and fixed salts, which are left. Similarly, carbonate of lime (chalk) is decomposed into carbonic acid gas and lime at a temperature below its fusing-point. If, however, we prevent the gas from escaping by confining the carbonate of lime in a hermetically closed gun-barrel, it can be melted at a high furnace-heat. A table of 'The Order of Fusibility of the Metals' is given by Miller in his *Elements of Chemistry*, 2d ed. II. 294. **FUSIBLE CALCULUS**, in *med.*, form of stone, or urinary calculus, white, smooth, soft, and brittle. It fuses before the blow-pipe; and contains ammonia, calcium phosphate, magnesium phosphate, and animal matter. **FUSIBLE METAL**, alloy composed of 2 parts of bismuth, 1 of lead, and 1 of tin. It fuses at 201° F., becoming pasty before it completely melts. It expands in a very anomalous manner: its bulk increases regularly from 32° to 95°; it then contracts gradually to 131°; it then expands rapidly till it reaches 176°, and from that point till it melts, its expansion is uniform. The faculty of expanding as it cools, while still comparatively soft, renders the alloy very serviceable to the die-sinker, who uses it to test the accuracy of his die, every line being faithfully reproduced in the cast made of the alloy. The proportions of the three metals are sometimes varied; and for another formula, see the table in **FUSING AND FREEZING POINTS**.

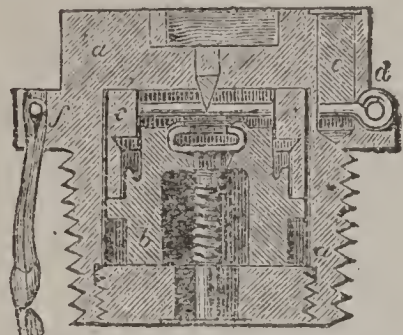
FUSE—FUSEE.

FUSE, or **FUZE**, n. *fūz*, or **FUSEE**, n. *fū-zē'* [*F. fusée*, a spindleful of thread, a squib a firework of sputtering gunpowder]: a tube of wood or metal, perforated down the side with a vertical row of holes, and used for firing shells. **FUSEE**, n. *fū-zē'*, a match, cigar-light.—*Fuse*, for exploding shells, or in blasting, is a tube filled with a composition of nitre, sulphur, and gunpowder, which will burn gradually. The distance between each hole representing a second, the range and time of flight are computed, and that hole is left open which will communicate the fire in the fuse to the loaded shell at the moment the latter touches the ground after being discharged. Of course, when combustion reaches this aperture, the shell is burst by the explosion of the contained gunpowder, and scattered around in numerous fragments. Fuses constructed on a similar principle are used in exploding military mines: see **MINES**, **MILITARY**. In the United States, the forms of F. mostly employed are known as time, safe, delay, percussion, concussion, combination, contact, and electrical; and nearly all bear the name of the inventor. The methods of their construction and application differ in each case. Since the close of the civil war, gunpowder has been largely superseded by nitro-glycerine, dynamite, and other newly invented explosives, and the electric current has taken the place of the old train-F. These agencies have been employed in some of the greatest engineering works, both mining and military. The inventive genius of the country has been active in providing new devices for exploders, new kinds of explosives, and new methods of discharge; and during 1888-9, these efforts were greatly stimulated by the depts. of war and the navy under the sanction of congress. As the little monitor of 1861 revolutionized the war vessels of the world, the official tests of new inventions of F., fulminators, explosives, shells, and cannon, promise material changes in the modern system of warfare. Recent inventions include new methods of ignition; an explosive more violent than dynamite, yet absolutely harmless to handle; a series of cannon arranged on an enormous wheel and discharged by electricity as the wheel revolves; a self-submerging ram and torpedo-boat using dynamite that is exploded on contact with an enemy or at any requisite distance by electricity or time F.; and the Zalinski 15-inch gun invented for the new cruiser *Vesuvius*, which has exceeded the requirements of the official test (1889, Jan.-Feb.) in throwing projectiles filled with explosive gelatine and dynamite, that are made to explode before, on, or after striking the water or an object aimed at, according to the will of the gunner. These projectiles are used with and without a delay-F., and are propelled by air pressure alone.

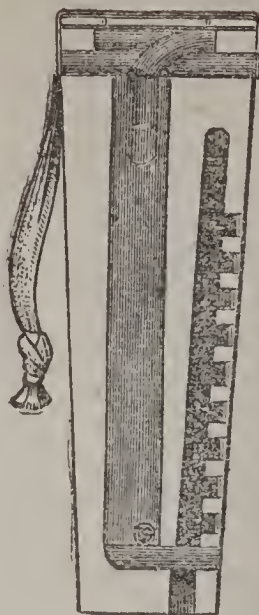
FUSEE, n. *fū-zē'* [*F. fuseau*, a spindle; *fusée*, the barrel of a crane: L. *fūsūs*, a spindle (see **FUSE** 2)]: spirally grooved cone or conical part of a clock round which is wound the chain attached to a box rotating through the force of a coiled spring in it: as the spring uncoils, the box revolves; and the cone being pyramidal the leverage grows



Fusarole.



Section of the Percussion-fuse.



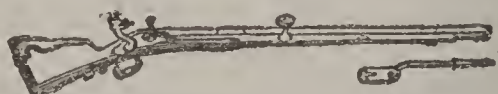
Section of the Common Time-fuse.



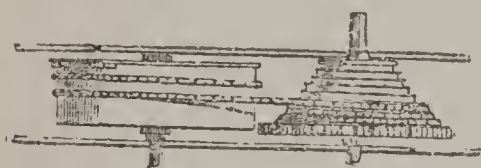
Fusil: in Her-aldry.



Fusil: in Her-aldry. Another specimen.



Fusil, with Bayonet of the Seventeenth Century.



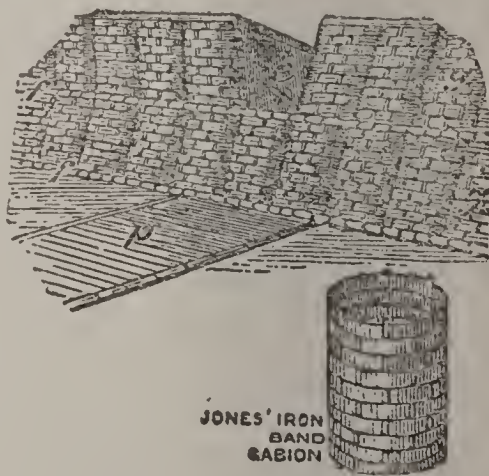
Barrel and Fuses of a Watch.



Fusil for projecting Grenades.



Gabardine.



JONES' IRON BAND GABION

Gabion.—Interior Slope of Musketry Parapet, revetted with Brushwood (Wicker) Gabions and Fascines: e, Embrasure; f, f, Fascines; g, g, Gabions; p, Basley's gun-platform.

FUSELI—FUSIL.

longer at the other end of the chain in proportion as the spring uncoils—thus counter-acting the loss of power, and keeping the driving force uniform. **FUSIFORM**, a. *fū'zī-fawrm* [L. *forma*, shape]: in *bot.*, spindle-shaped; tapering like the root of a carrot.

FUSELI, *fū'zēh-lē*, HENRY: 1742—1825, Apr. 16; b. Zurich, Switzerland; second son of John Caspar F. or Fuessli, portrait-painter, and author of *Lives of the Swiss Painters*. He studied in his native town and at Berlin, travelled with Lavater 1761, and then went to England, where, by Reynold's advice, he applied himself to art, and studied in Italy eight years. In 1778, he returned to England. In 1780, was elected a member of the Royal Acad., where, nine years later, he became prof. of painting. He died at Putney Hill, near London, and was buried beside his friend Sir Johua Reynolds, in St. Paul's. His most remarkable works are *The Ghost of Dion*, from Plutarch; *Lady Macbeth*; *Hercules and the Horses of Diomedes*; and *Milton's Gallery*, comprising 47 designs from *Paradise Lost*. F.'s imagination was bold, but coarse; he had more genius than art; and his execution was often spasmodic. His art-criticism, however, ranks among the best in the language. His literary works, with a narrative of his life, were published by Knowles (3 vols. London 1831).

FUSEL, *fū'zēl* (or *FŌU'SEL*) OIL: known also as **POTATO SPIRIT** [Bav. *fusel*, bad brandy; *fuseln*, to trifle]: a frequent impurity in spirits distilled from fermented potatoes, barley, rye, etc., to which it communicates a peculiar and offensive odor and taste, and an unwholesome property. Being less volatile than either alcohol or water, it accumulates in the last portions of the distilled liquor. According to Liebig, it is formed principally in the fermentation of alkaline or neutral liquids, while it never occurs in acidulous fermenting fluids which contain tartaric, racemic, or citric acid. It consists mainly of a substance to which chemists have given the name of amylic alcohol, composition $C_5H_{11}.O.H$. It is a colorless limpid fluid, with a persistent and oppressive odor and a burning taste. It is only sparingly soluble in water, but may be mixed with alcohol, ether, and the essential oils in all proportions. Any spirit which produces a milky appearance when mixed with four or five times its volume of water, may be suspected to contain it. Fusel oil is used for the purpose of yielding pear-essence for the so-called jargonelle-drops; it has been patented as a solvent for quinine; and according to Liebig, is sometimes used in lighting distillery buildings.

FUSIBILITY, FUSIBLE: see under **FUSE 1**.

FUSIFORM, a.: see under **FUSEE**.

FUSIL, n. *fū'zīl* [F. *fusil*; It. *focile*, a fire-steel for a tinder-box—from mid. L. *focus*, fire]: a light musket or firelock. **FUSILEER**, or **FUSILIER**, n. *fū'zī-lēr'* [F. *fusilier*]: one of the soldiers of a foot regiment originally armed with a fusil: now all foot-soldiers carry the improved rifle, so that *fusiliers* is (in some armies) a mere title of honor con-

FUSIL—FUSING AND FREEZING POINTS.

ferred upon certain infantry regiments as a reward for distinguished conduct, a fusilier regiment being supposed to hold a high position in relation to other regiments. **FUSILADE**, n. *fū'zīl-ād'* [F. *fusillade*, a shooting]: discharges of firearms in military exercises.

FUSIL, a. *fū'zīl* [L. *fūsus*, poured out, melted]: in *OE.*, fused; capable of being melted.

FUSIL, n. *fū'zīl* [from a supposed mid. L. *fusillus*—from L. *fūsus*, a spindle]: a spindle in heraldry, represented as longer and more acute than a Lozenge (q.v.).

FUSING (or **FUSION**) **DISK**: disk of steel used for cutting cold iron or steel bars; the invention of Jacob Reese, of Pittsburgh, Penn. It had long been known that a rapidly rotating disk of steel or iron would cut through the hardest steel if its periphery was held in contact therewith. Mr. Reese modified its action. He adopted such a velocity of rotation and size, that a peripheral speed of 2,500 ft. per second was secured, and he caused the bar which is to be cut, and which is held in front of the disk's edge, to rotate about 200 revolutions per minute in the same direction as the saw. Thus the two peripheries of saw and bar move in opposite directions. The bar is quickly cut off, a $1\frac{5}{8}$ round bar being severed in from 2 to 10 seconds. The disk is $\frac{3}{16}$ inch thick and is toothless; it makes a cut or kerf $\frac{5}{8}$ inch wide. The saw remains cool, and the bar becomes heated. Very extraordinary claims have been made as regards its mode of action. It is said that the disk and iron do not touch, and that the cut is made without any contact or friction between the solids. The debris is said to be fused metallic iron, and not magnetic oxide, if the bar revolves; if the bar is stationary, it is said to be magnetic oxide. Probably, however, it is by frictional contact that the cutting is effected.

FUSING AND FREEZING POINTS: terms applied to the temperature at which solids assume the liquid form and liquids become solid. The following table gives some determinations at the best approximate of the fusing-point:

Mercury	—39°	Alloy (3Sn, 2Pb).....	333°
Oil of vitriol	—30°	Tin.....	446°
Bromine	— 9°·5	Bismuth.	507°
Oil of turpentine.....	14°	Nitrate of soda.....	591°
Ice	32°	Lead.....	620°
Lard.....	91°	Nitrate of potash.....	642°
Phosphorus.....	111°·5	Zinc	773°
Potassium.....	136°	Antimony (about).....	900°
Yellow wax.....	143°·6	Silver.....	1773°
Stearic acid.....	156°	Copper.....	1996°
Sodium	207°·7	Gold	2016°
Fusible metal (5Pb, 3Sn, 8Bi)	212°	Cast-iron	2786°
Iodine.....	225°	Wrought-iron	2912°
Sulphur	239°	Platinum.....	3227°
Alloy (1Sn, 2Bi).....	286°		

It is evident from this table that alloys may have a fusing-point far below that of any of the metals which enter into their composition. Similarly, mixtures of various silicates fuse at a temperature far below that required to melt any one of them; and the same remark applies to mixtures of various chlorides, carbonates, etc.

FUSION—FUSS.

Most solids, when heated to their fusing-point, change at once into perfect liquids; but some, e.g. platinum, iron, glass, phosphoric acid, the resins, and many others, pass through an intermediate pasty condition before they attain perfect fluidity, and in these cases it is difficult, if not impossible, to determine the exact fusing-point. This intermediate condition is termed *vitreous fusion*, because it is a characteristic property of glass. It is in this intermediate state that glass is worked, and iron and platinum forged.

As a general rule, the freezing-point is the same as the fusing-point—that is to say, if a substance in the liquid form be cooled below the fusing-point, it again becomes solid. But there are cases in which a liquid can be cooled several degrees below its fusing-point; thus, by keeping water perfectly still, it can be cooled to 5°, or even 1°·4 before it freezes. If, however, we drop a solid body into water in this condition or if we shake the vessel containing it, congelation begins at once, and the temperature rises to 32°. This phenomenon is exhibited to a still greater degree in viscid fluids, like the oils. It is well known that the freezing-point of water is depressed by the presence of salts. Thus, sea-water freezes at about 26°·6, and a saturated solution of common salt must be cooled as low as 4° before freezing. Despretz has given the freezing-points of various saline solutions at different degrees of concentration, in Vol. IV of the *Comptes Rendus*, p. 435.

FUSION, n.: see under FUSE 1.

FUSISPORIUM, n. *fŭ-sĭ-spŏr'ĭ-ŭm* [L. *fungus*, extended, broad; Gr. *sporos*, seed]: in *bot.*, genus of hyphomycetous fungi, forming first a mildew, and next an extensive gelatinous stratum, with spindle-shaped spores.

FUSIYAMA: see FUJI-YAMA.

FUSS, n. *fŭs* [Swiss, *pfusen*, to make a fizzing noise: Sw. *fias*, stir: comp. Gael. *fuis*, active, busy]: a bustle in a small matter: much ado about trifles. FUS'SY, *f a. -sĭ*, troublesome and bustling about a small matter. FUS'SILY, *ad. -lĭ*, in a bustling manner. FUSSINESS, n. *fŭs'sĭ-nĕs*, the state of being fussy. *Note*.—Skeat cites Icel. *fúss*, eager for: OH. Ger. *funs*, ready, willing.

FUST, n. *füst* [OF. *fust*; F. *fut*, a staff of wood, a cask—from L. *fustem*, a thick knobbed staff: in *arch.*, the shaft of a column from the astragal to the capital.

FUST, *füst* (or FAUST), JOHANN: d. abt. 1466: associate of Gutenberg (q.v.) and Schöffer in establishing the art of printing. There is much obscurity about his early life and employments. He has been called the inventor of printing, the scion of a rich and respectable burgher family of Mainz, and a wealthy goldsmith. The name was written FUST till 1506, when Johann Schöffer, F.'s grandson, in dedicating a translation of Livy to the emperor, wrote it FAUST, and his descendants observed the same spelling. The facts appear to be that, instead of being a goldsmith as was his brother Jacob, F. was a kind of banker or broker, a lender of money at high interest; that his association with Gutenberg and the development of printing was owing to a purely business accident—that, becoming acquainted with him at the time he was struggling to perfect his scheme of typography, he lent him money to carry on his experiments; and that subsequently, discerning the great value of Gutenberg's discovery, he took advantage of his pecuniary helplessness to rob him of the fruits of his invention. It is known that F. prosecuted Gutenberg to recover money advanced to him, 1455; that, on the inventor's declaration of inability to pay, F. took possession of the entire business; that F. then associated Peter Schöffer, his son-in-law and a caligrapher of much note, with himself, and that they continued the business with large success till 1462. The sacking of Mainz in that year caused a dispersion of the workmen, and the secrets of the art were conveyed by them to other cities. F. himself went to Paris, doubtless with the intention of establishing himself in business in that city, and in 1466, July, presented Louis de Lavernade, first pres. of the parliament of Toulouse, a copy of his second edition of Cicero. During the two succeeding months, Paris was ravaged by a terrible plague, and it is believed that F. succumbed to it, Oct. 30. The association of F. with Gutenberg began 1450, Aug. 22, when F. agreed to advance the inventor 800 gold florins to make and procure tools and materials, and 300 florins a year for his wages and living and business expenses. F. held a mortgage on the tools and materials for security, and both he and Gutenberg were to share profits equally. Under this arrangement, Gutenberg first printed at his house in Zum Jungen a *Catholicon*, probably a small glossary for children, long since lost, and followed it with *Donatus de octo partibus orationis*, containing 27 lines to the page (1451); the *Letters of Indulgence* granted by Pope Nicholas V. to the ambassador of the king of Cyprus, of which 13 copies printed on vellum remain (1454); and an *Appeal to Christendom against the Turks*. Their most noted work was the Latin Bible, known as the 42-line Bible from the number of lines on a page, and as the Mazarin Bible because the first described copy was found in the library of Cardinal Mazarin. This work was a folio of 1,282 printed pages, a close imitation

of the best writing, with spaces left for the illumination of initials by hand, and was finished 1455. The Lenox Library, in New York, has the only complete copy of this work in the United States, for which the late James Lenox paid \$2,600.—After F. secured sole control of the business and associated his son-in-law with him, he published first a *Psalter* (1457, Aug. 14), a work of 350 pages, the first printed book with complete date, which had large initials printed in two colors each, red and blue, from type made in two pieces. Schöffer is credited with having discovered a method of founding characters or type by means of a punch, and it has been claimed that he invented also the movable mold; but in the colophon of the *Psalter* he claimed only the mode of printing rubrics and colored capitals. The *Psalter* was followed by *Rationale divinorum officiorum* (Durandus), fol., 160 leaves (1459); the *Clementine Constitutions* with the gloss of Johannes Andreæ, 51 leaves (1460); several papal bulls, proclamations of Adolf of Nassau, etc. (1461–2); *Biblia Sacra Latina*, fol., 2 vols. 242 and 239 leaves, 48 lines to page (1462); the *Sixth Book of Decretals*, with Andreæ's gloss, fol., 141 leaves (1465, Dec. 17); Cicero's *De Officiis*, 4to, 88 leaves (1465; first printed classic author; copy in the Astor Library, New York); and *Grammatica rhytmica*, fol., 11 leaves (1466).—For many years, F. the printer was confounded with Faust the physician, who, according to the legend, made a bargain with the devil at the price of his own soul, and afterward was known as Dr. Faust the magician. The assertion of their identity once made, it is not to be wondered that the superstitions of the day should have given it wide circulation. In support of the theory, it was claimed that the art of printing was taught F. by the devil; and when F. stated in his colophons that his books were not made with pen or pencil—as all the books with which the people of Germany were then familiar had been—it is easy to be seen how quickly the people should have associated such an assertion with magic. Again, it was impossible to understand how several copies of an identical book could be exactly similar in every respect as the copies of F.'s *Bible* were, except on the ground of Satanic agency. It is narrated that F. the printer sold copies of his *Bible* in Paris; and when their similarity was discovered, the purchasers became alarmed, returned their books, demanded their money back, and drove F. to seek safety first in Mainz and then in Strasburg. Some authorities have further claimed that legal proceedings were taken in Paris against F. the printer on the ground that he was a magician; but no records have been found to sustain the claim. Another subject of wonder and accusation was that F. could produce as many copies of a book in a day as the skilled copyists in the convents could perfect in a year; and this ability was charged to his compact with the devil, for in their estimation no mortal man could work so rapidly. It was said too that F. incurred the hatred of the monks, who grew rich by copying the books of the day, because they feared his black art would cut off their income. But against this it

FUSTED—FUSTIC.

is known that Gutenberg, Schöffer, and F. the printer were on friendly terms with the inmates of many convents and monasteries; and, further, that it was the custom of the early printers to set up their presses in large monasteries. The controversial literature on the two F's is voluminous, profound, and at this day curious. See FAUST, DR.

FUSTED, a. *fūs'tēd* [OF. *fusté*, tasting or smelling of the cask]: having a bad smell, moldy. FUS'TY, a. *-tī*, ill-smelling; rank. FUS'TINESS, n. an ill smell from moldiness, etc. FUST, v. in *OE.*, to grow fusty or smelling of mold. FUS'TING, imp. FUS'TED, pp.

FUSTET: see FUSTIC.

FUSTIAN, n. *fūs'tyan* [OF. *fustaine*—from It. *fustagno*, fustian—so called as brought from *Fostat*, near Cairo, or another name of Cairo]: a thick, strong cloth made of cotton, having a pile like velvet, but shorter, and manufactured in nearly the same manner—viz., by leaving loops standing upon the face of the fabric, and then cutting them through so as to form upright threads, afterward smoothed by shearing, singeing, and brushing: see VELVET: also MOLESKIN AND CORDUROY. An inflated swelling kind of writing or speaking; bombast: ADJ. made of fustian; absurdly pompous: FUST'IANIST, n. *-yan-ist*, one who admires inflated talk.

FUSTIC, n. *fūs'tik*, or FUSTET, n. *fūs'tēt* [F. *fustoc* or *fustet*]: name given to two kinds of dye-wood used for producing a yellow color, and with chemical additions, other colors, such as brown, olive, and green. The French name *Fustoc* seems connected with *Fustet*, a kind of sumach found in the s. of Europe; and to have been transferred to a very different plant, the *Maclura tinctoria* of Don, or *Morus tinctoria*, tree of nat. ord. *Moraceæ*, native of the W. Indies, Mexico, Brazil, Columbia, etc. The fustic is a large and handsome tree, the wood is of greenish-yellow color, used sometimes in mosaic cabinet-work and turning, but chiefly in dyeing. About 10,000 tons are brought annually into Britain. The tree is very abundant in Campeachy. The wood contains a great quantity of coloring matter, which forms the most durable of vegetable yellow dyes; but as the color is rather dull, it is used more for producing other colors. The name OLD FUSTIC is sometimes given to it, and YOUNG FUSTIC to the wood of *Rhus cotinus*. These terms began to be employed about the beginning of last century, from the mistaken notion that the one, in small pieces, was the wood of the young tree, and the other, in comparatively large logs, of the same tree in a more mature state.—The OSAGE ORANGE (q.v.) of N. America (*Maclura aurantiaca*) is nearly allied to old fustic; its wood also affords a yellow dye.—OLD FUSTIC, or Yellow Wood, is employed for dyeing woollens yellow, also to impart to them green and olive colors when mixed with indigo and salts of iron. It furnishes a yellow coloring matter, which may be obtained in crystals by evaporating its watery solution. This substance is termed moritannic acid, composition $C_{13}H_{10}O_6$. The bichromates of potash

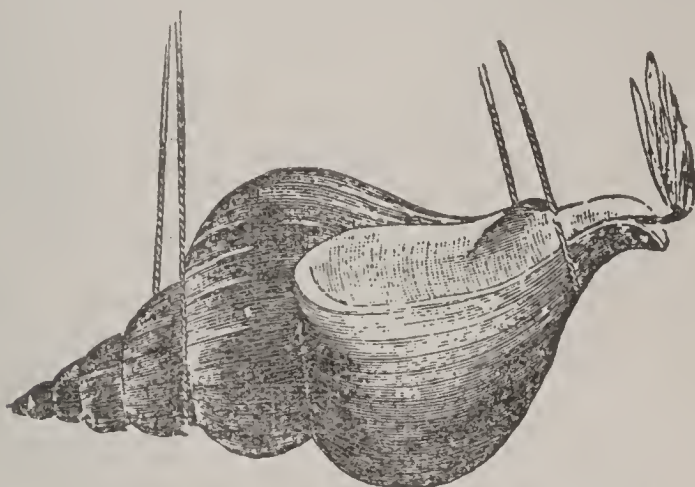
FUSTIGATE—FUTAK.

and of lead have largely superseded Old Fustic.—YOUNG FUSTIC is the wood of *Rhus cotinus* or *Venetian sumach*. It contains a yellow coloring matter, to which the name *Fusteric* or *Fustin* has been given. It is used generally in combination with other dyes, in order to strike some particular tint.

FUSTIGATE, v. *fūs'ti-gāt* [L. *fustigātus*, cudgelled—from *fustis*, a cudgel]: to beat with a cudgel or stick. FUS'TIGATING, imp. FUS'TIGATED, pp. FUS'TIGA'TION, n. *-gā'shūn*, a beating with a stick or cudgel.

FUSTY: see under FUSTED.

FUSUS, n. *fū'zūs*, [L. *fusus*, a spindle]: a genus of gastropodous mollusks nearly allied to *Murex* (q. v.), having a spindle-shaped shell, with a very elevated spire, the first whorl often much dilated, and a straight elongated canal. The whorls are not crossed by varices, as in *Murex*: the species were formerly, however, included in that genus. About 100 existing species have been described, and more than three times that number of fossil ones. The existing species are distributed over the whole world, living generally on muddy and sandy sea-bottoms at no great depths.



Roaring Buckle, as used by the Zetlanders.

F. antiquus is known in the s. of England as the RED WHELK, and in Scotland as the ROARING BUCKIE, from the continuous sound—as of waves breaking on the shore—heard when the empty shell is applied to the ear. In the cottages of Zetland, the shell, generally about six inches long, is used for a lamp, being suspended horizontally by a cord, its cavity containing the oil, and the wick passing through the canal. This mollusk is often dredged up with oysters. It is eaten by the poor, but is used as bait for cod, skates, etc. This genus makes its first appearance in the Oolite, in which 10 species have been noticed. The numbers increase to 35 in the Cretaceous rocks, to 100 in the Eocene, and to 150 in the Miocene and Pliocene. FUSULINA, n. *fū'zū-lī'nā*, in *geol.*, a genus of spindle-shaped foraminifera of the carboniferous formation.

FUTAK, *fót-tók'*: town of Lower Hungary, county of the Lower Bacs, on the left bank of the Danube; lat. 45° 15' n., and long. 19° 42' w. It has a beautiful castle and

FUTEHGUNGE—FUTTUHA.

garden, and the inhabitants raise vegetables and tobacco extensively. F. has great trade in corn, and has a fair in Nov., frequented by merchants from Turkey, Greece, and Armenia. Pop. (1890) 5,392.

FUTEHGUNGE, *füt-eh gūnj'*, now often spelled **FATEHGANJ** (*Victory Market*), known as *Eastern F.*: town of the dist. of Bareilly Rohilcund; near the right bank of the Bhagal; lat. $28^{\circ} 4' \text{ n.}$, and long. $79^{\circ} 42' \text{ e.}$ The battle from which this spot is designated, was fought 1774, between the British and the Rohillas, and gave to the Nawâb of Oude, then an ally of the English E. India Company, a large part of Rohilcund; and it was to commemorate that event, that Eastern F. was built by that prince.

FUTEHGUNGE, now often spelled **FATEHGANJ** (*Victory Market*); known as *Western F.*: town of the dist. of Bareilly Rohilcund; lat. $28^{\circ} 28' \text{ n.}$, and long. $79^{\circ} 24' \text{ e.}$ The conflict that gave name to this locality occurred 1796 between the British and the Rohillas. The only eminence in the neighborhood, the most hotly contested point in the struggle, bears the memorials of those who fell—a plain and simple monument of 14 British officers, and a carved and minareted tomb of two Rohilla chieftains.

FUTHORK, n.: the Runic alphabet: see **RUNES**.

FUTILE, a. *füt'il* or *-t'il* [L. *futile*, light, vain—from L. *fütīlis*, that cannot contain, that cannot be relied on]: trifling; of no weight or importance; of no effect; unsuccessful. **FUTILELY**, ad. *-lī*. **FUTILITY**, n. *fū-tīl'ī-tī*, want of weight or effect; worthlessness. **FUTILITARIAN**, n. *-tūr'ī-an*, one who pursues what is worthless.

FUTTEHPUR, *füt-teh-pôr'*, or **FATEHPUR**: district in the N. W. Provinces of India, wholly within the Doab, whose entire breadth it occupies from the Jumna to the Ganges. It is immediately w. of the dist. of Allahabad, and contains 1,639 sq. m. In 1798, it was described as a waste, but now it has the appearance of a boundless garden. It yields large quantities of cotton, and by means of its bordering rivers, and a branch of the Ganges canal, it possesses considerable facilities for inland navigation. Pop. (1881) 683,745.

FUTTEHPUR, or **FATEHPUR**: capital of a district in the Doab. N. W. provinces of India, on the great trunk-road between Calcutta and Delhi, and on the E. Indian railway, 70 m. n. w. of Allahabad. It is a thriving place, with (1881) 21,328 inhabitants, and contains a small but very elegant mosque.

FUTTOCKS, n. plu. *füt'tōks* [corruption of *foot-stocks* or *foot-locks*]: the upright curved timbers or ribs of a ship springing from the keel, which hold the ship together; small shrouds over the lower ones.

FUTTUHA, *füt'tō-ha*, or **FUTWA**, *füt'wa*: town in the dist. of Patna, Bengal. Its position at the confluence of the Punpun and the Ganges, and on the railway, gives it some commercial importance. As the Ganges is here deemed peculiarly sacred, F. is, at certain seasons of the

FUTTYGURH—FUTURE DEBT.

year the resort of vast numbers of pilgrims. Pop. abt. 12,000.

FUTTYGURH, *fût-têh-gŭr'*, or FATEHGARH, *fât-têh-gŭr'*: military cantonment of Furruckabad; about three miles e. of that city, on the opposite or left bank of the Ganges. Government has here an important gun-carriage factory. Its name became infamous, in the mutiny of 1857, less for the outbreak that occurred on the spot, than for the unparalleled sufferings of the hapless fugitives—men, women, and children. Pop. 12,000.

FUTTYPUR, *fât-têh-pôr'* or FATEHPUR, *fât-têh-pôr'*: town in the dist. of Saugur, and chief-commissionership of the Central Provinces, India; on the Unjon, a tributary of the Nerbudda, about 20 m. from their junction; lat. 22° 38' n., and long. 78° 38' e. It is a place of some importance as the residence of three Gond rajahs.

FUTURE, a. *fŭ'tŭr* or *-chŭr* [F. *futur*—from L. *futŭrŭs*, about to be; It. *futuro*]: that is to come; that which is to exist: N. time to come; a tense in grammar implying an event to come. FUTURITY, n. *fŭ-tŭ'ri-tŭ*, time to come; event to come. FU'TURIST, n. *-ist*, one who believes that the Bible prophecies are to be fulfilled in the future.

FU'TURE DEBT: debt in which the obligation to pay and the time for payment is fixed and certain, but the day for performance has not arrived. Of such a debt, it was said in the civil law *dies cedit etsi nondum venerit*; and it was distinguished from a contingent debt, i. e., a debt payable on the performance of a condition which was uncertain, in which it was said *dies nec cedit nec venit*. Thus, an obligation to pay six months hence is a F. D.; an obligation to pay 'if my ship returns from Spain,' is contingent. In the event of the death or bankruptcy of a person having large commercial transactions, it is often of great importance that the right of the holders of such securities should be accurately fixed. In Rome, on the death or bankruptcy of a citizen, a creditor holding a claim for a F. D. was entitled to payment, deducting a percentage proportionate to the date at which his debt was payable; but a contingent creditor received only a security for payment in case his debt should become payable. This general principle has been introduced into the legal systems of modern states. In England, a F. D. in order to found a valid claim, must be in writing, but may be constituted by bond, bill, or note or other security. By common law, such a claim could not be enforced until the actual time for payment arrived; and formerly, in case of bankruptcy, a creditor on a debt of this kind was not allowed to insist in his claim. At the same time, the bankrupt's discharge was held not to release him from a debt which had not been admitted to claim in the process; and hence debtors were sometimes incarcerated for years on debts which they were wholly unable to discharge: see IMPRISONMENT FOR DEBT. This state of things was productive of manifest injustice on both debtor and creditor; on the latter, by excluding him from insisting in his claim at a time when he might have

FUTURE ESTATE—FUZZ.

obtained a partial payment; on the former, by punishing him for his default when he was deprived of the means of making any return. The rule now is that, in bankruptcy, where a debt is not immediately payable, the creditor is entitled to prove his debt, and receive a dividend, deducting interest at 5 per cent. for the period to elapse before the date when the debt becomes payable. All debts are future in bankruptcy which were not payable when the debtor committed an act of bankruptcy. A debtor may petition for bankruptcy in respect of a future debt.—See ARRESTMENT.

FUTURE ESTATE, in Law: estate which is to come into one's possession at a future day. According to 11 N. Y. Rev. Stat. 3d ed., an F. E. is an estate limited to commence in possession at a future day either without the intervention of a precedent estate, or on the determination by lapse of time, or otherwise, of a precedent estate created at the same time. In general an F. E. includes remainders reversions, contingents, and executory devises; that defined above is declared to be vested or contingent, but excludes reversions which cannot be said to be created at the same time, because they are a remnant of the original estate remaining in the greater. (Bouvier)

FUTURE LIFE: See HEAVEN: HELL: IMMORTALITY.

FUX, *fúks*, JOHANN JOSEPH: 1660-1741; b. Marein, Styria, Austria: composer. He is supposed to have been born of poor parents. That he was educated for an organist is apparent from the fact that he held such a position in one of the principal churches of Vienna 1696, and the thoroughness of his education is attested by his appointment by Leopold I. as imperial court composer 1698. He became organist at St. Stephen's Cathedral, Vienna 1704, and passed the remainder of his life at the Austrian court under Leopold, Joseph I., and Charles VI. F. composed the opera *La Constanza e la Fartezza* for the coronation of Charles VI. as king of Bohemia 1723, and being sick at the time of its performance at Prague was carried on a litter from Vienna and seated in the imperial box at the theatre by the emperor-king's command. He composed upward of 400 musical works, and a noted theoretical work on music, *Gradus ad Parnassium sive manuductio ad compositionem musicæ regularem methoda nova ac certa nondum ante tam exacta ordine in lucem edita, elaborata a Joanne Josepho Fux* (Vienna 1725), which Charles VI. had published at his own expense.

FUZE: see FUSE 2.

FUZEE, n. *fû-zē'* [F. *fusée*, a spindleful of thread]: a dangerous excrescence on the shank-bone of a horse, piercing the bone.

FUZZ, v. *füz* [Ger. *pfuschen*; Swiss, *pfusen*, imitative of the sound of water flying off a heated surface]: to fly off with a sort of buzzing noise, as water from a hot surface. **FUZ'ZING**, imp. **FUZZED**, pp. *füz'd*. **FUZZLE**, v. *füz'l*, to confuse the head with drink; to fuddle. **FUZZLING**, imp. *füz'ling*. **FUZZLED**, pp. *füz'ld*. **FUZZY**, a. *füz'zī* [Scot.

FY—FYZABAD.

fossy or *fozy*): consisting of a frothy spongy mass. **FUZZ-BALL**, a kind of fungus filled with dust; the puff-ball.

FY, int. *fī* [Ger. *pfui*]: a word expressing blame, dislike, or disapprobation; for shame.

FYKE, n. *fik* [etym. doubtful]: a bag-net, open at one end, to allow fish to enter, but opposing their exit.

FYNE, *fin*, **LOCH**: arm of the sea extending n. and n.e. from the Sound of Bute in the s. of Argyleshire. to beyond Inverary in the north; bounded by the district of Cowal on the e., and by those of Argyle, Knapdale, and part of Cantire on the w. It is 43 m. long, 2 to 10 m. broad, and 40 to 70 fathoms deep. Its shores are deeply indented and bordered by low bare hills, which rise higher and are wooded near Inverary. On the w. side, it sends off a small branch leading to the Crinan canal. Loch F. is noted for its herrings.

FYZABAD, *fī zā bād'* (better *Faizabad*): rapidly decaying city of Oude, India, on the right bank of the Ghogra; a station on the Oudh railway, also a military cantonment. Originally an appendage of Ayodha or Oude, the ancient cap. of the country, F. became, 1730, itself the seat of government. But 1775, immediately after the annexation of part of Rohilcund (see **FUTEHGUNGE**), it was supplanted by Lucknow, about 90 m. w. in the direction of the newly acquired territory. Pop. (1891) 79,500.

G

G, or *g*, *jê*: seventh letter in the Roman alphabet, and in the modern alphabets derived from it; a consonant. For the history of the character, see ALPHABET: also C. The original and proper sound of G (corresponding to Gr. *γ*) is heard in *gun*, *give*, *glad*. But the same natural process which turned the *k*-sound of *c* before *e* and *i* into that of *s* (see C), produced a similar change on G, so that before *e* and *i* it came to be pronounced by the Latins like *dzh*. The sibilation of the letter *g* before *i* followed by a vowel, had begun as early as 4th c. after Christ, as is evident from the misspelling in inscriptions; in the case of *c*, the change can be detected much earlier. From the Latin, the *dzh*-sound of *g* passed into the Romanic tongues, and into English. As a general rule in English, in words derived from the classical and Romanic languages, *g* has the hissing sound before *e*, *i*, and *y*; it has its natural sound in all words before *a*, *o*, and *u*; and it retains it in Teutonic words even before *e* and *i*.

G, in its proper power, belongs to the order of gutturals, *k* or *c*, *g*, *ch*, *gh*; of the two 'bare' gutturals, *g* is the *flat* (or medial), and *k* the *sharp*; while *gh* and *ch* are the corresponding aspirates (q.v.).

The following are some of the interchanges between *g* and other letters: Lat. *ager*, Gr. *agros*, Eng. *acre*, Ger. *acker*; Gr. *triakonta*, Lat. *triginta*; Gr. *gonu*, Lat. *genu*, Eng. *knee*; Lat. (g)*nosco*, Gr. *gignosco*, Eng. *know*; Lat. *genus*, Eng. *kin*; Gr. *chen*, Ger. *gans*, Eng. *goose* and *gander*; Lat. *hesternus*, Ger. *gestern*, Eng. *yester* (day); Lat. *germanus*, Span. *hermano*. The convertibility of *g* and *y* is seen in the old English participle in *y*, as *yclad*, corresponding to Sax. and Ger. *ge-*; in Ger. *gelb*, Eng. *yellow*; Ger. *tag*, Eng. *day*; Ger. *mag*, Eng. *may*; *yate* for *gate*; *yard* for *garden*, Lat. *hortus*. In Italian, *gi* is substituted for *j*, as *Giulio* for *Julius*; and in French, which has no *w*, that letter is represented by *gu*, as *guerre*, *guarder*, for Eng. *war*, *ward*, or *guard*. G has been frequently dropped out, as Lat. *nosco* for *gnosco*; Eng. *enough*, compared with Ger. *genug*; *agone*, with *ge gangen*; Lat. *magister*, Fr. *maistre* or *maître*, Eng. *master*. *May*, Lat. *Maius*, contracted from *Magius*, is from a root *mag*, or (Skr.) *mah*, to grow: so that May means the season of growth.

G, in Music, is the fifth sound of the natural diatonic scale of C, and the eighth sound of the chromatic scale. It stands in proportion to C as 2 to 3; is a perfect fifth above C, and the second harmonic arising from C as a fundamental note. In the solmization of Guido Areticus, the

note G. was called Sol, Re, or Ut, according as the hexachord began with C, F, or G. G major as a key has one sharp at its signature, viz., F sharp. G minor has two flats at its signature, viz., B flat and E. flat.

GAAL, *gál*, JOZSEF: Hungarian author: b. Nagy Karoly, 1811. He studied at the College of Buda, and at the Univ. of Pesth, and entered the administrative career, being attached to the Hungarian council of lieutenancy. G began writing early, and proved equally successful when gossiping in the columns of Kossuth's famous *Pesti Hírlap*, and when engaged in translating a masterpiece of Cervantes, filling the periodicals with tales and novels, or furnishing original works for the National Theatre. The sketches of country-life as it was, and as it still continues on the vast plains of Hungary, are nowhere more vivid and more true than in G.'s comedies and tales. The following are some of his original compositions; *Szirmay Ilona*, novel, 2 vols. (Pesth 1836); *Peleskei Notarius* (The Notary of Peleske, Pesth 1838), comedy in four acts—might be called the Hungarian comedy *par excellence*; *Szvatopluk*, tragedy in five acts. Tales: *Pusztai Kaland* (An Adventure on the Hungarian Prairies); *Tengeri Kaland az Alfoeldoen* (Seafaring Adventures in Lower Hungary); *Hortobágyi éjszaka* (A Night on the Heath of Hortobágy). During the sojourn of the Hungarian Diet at Debreczin (1849), G. was editor of a journal combating extreme radical views.

GABARDINE, or GABERDINE, n. *găb'ér-dên* [Sp. *gabardina*]: a loose outer garment; in the *middle ages*, a long loose coat or cassock rendered obligatory on the Jews to wear.

GABBLE, v. *găb'l* [Icel. *gabba*, to mock; *gabb*, silly talk: Scot. *gab*, the mouth, talk: Dan. *gab*; Gael. *gab*, mouth]: to prate; to talk idly and rapidly, or without meaning: N. loud or rapid talking without meaning; inarticulate sounds. GAB'BLING, imp. GABBLED, pp. *găb'ld*. GABBLER, n. *găb'lér*, one who. GAB, n. *găb*, *familiarly*, talkativeness; loquacity: V. to talk much; to talk idly. GAB'BING, imp. GABBED, pp. *găbd*.

GABBRO, *găb'brô*: Italian name of a variety of greenstone composed of felspar and diallage. It is equivalent to euphotide or diallage rock.

GABELENTZ, *gă'bêh-lěnts*, HANS CONON VON DER: 1807, Oct. 13—1874: b. Altenburg: German philologist. He was educated at the universities of Leipsic and Göttingen. He then studied the Finno-Tataric languages, and published, 1833, his *Eléments de la Grammaire Mandschoue*, in which the entire idiomatic character of that language was developed in concise rules. He was interested also in oriental learning. With J. Löbe, he published a critical edition of the Gothic translation of the Bible by Ulfilas, with a Latin translation, and with a Gothic glossary and grammar appended (Leipsic 1843-46). Besides a Syrjan grammar (*Grundzüge der Syrjänischen Grammatik*, Altenburg 1841), he furnished contributions to periodicals on

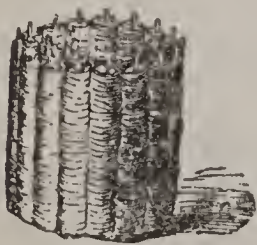
the Mordvinian and Samoyed languages. An important contribution to the science of language, is his *Die Melanesischen Sprachen* (2 vols. 1860, 73). The *Beiträge zur Sprachenkunde*, in three parts, appeared 1852, and *Ueber das Passivum* 1860. In 1864 he published the Mantchurian translation of the Chinese works, *Se-schu*, *Schu-king*, and *Schi-king*, with a glossary in German. G. knew more than 80 languages.

GABELLE, *ga-běl'* [F., from Ger. *gabe*, gift or tribute]: originally in general, every kind of indirect tax, especially the tax upon salt. This impost, established 1286, in the reign of Philippe IV., was meant to be only temporary, but was declared perpetual by Charles V. It varied in the different provinces. Those that were most heavily taxed were called *pays de grande gabelle*, and those that were least heavily taxed, *pays de petite gabelle*. It was unpopular from the first, and the attempt to collect it occasioned frequent disturbances. It was finally suppressed 1789. The name *gabelous* is still given by the common people in France to tax-gatherers.

GABERDINE, n.: see GABARDINE.

GABERLILTIE, n. *gā'bēr-līl'tī* [Gael. *gabair*, a talker; Scot. *lilt*, Gael. *luailte*, a merry lay or song]: in *prov. Eng.*, a ballad-singer. GABERLUNZIE, n. *gā'bēr-lón'zī* [Gael. *lun-dair*, an idle talkative beggar; or *gaban*, cloak, and *lunzie*, linsey-woolsey—from the clothing]: in *Scot.*, the man who carries the wallet; a privileged beggar—also called a *bedesman* or *bluegown*: see BEAD.

GABION, n. *gā'bī-ŭn* [F. *gabion*—from It. *gabbia*, a cage; *gabbione*, a gabion—related to L. *cavea*, hollow]: hollow cylinder of basket-work, employed in field or temporary fortification, and varying in diameter from 20 inches to 6 ft. in height from 2 ft. 9 inches to 6 ft. In constructing it, stout straight stakes are placed upright in the ground in a circle of the required diameter, and are then wattled together with osiers or green twigs, as in the formation of baskets. The apparatus being raised from the ground, the ends are



Gabion.

fastened, and the G. is ready to be rolled to any place where it is desirable to form a breast-work against the enemy. Placed on end, and filled with earth, a single row is proof, except at the points of junction, against musketry fire, and by increasing the number of rows, any degree of security can be obtained. The G. has the advantage of being easily movable; while with its aid a parapet can be formed with far less earth, and therefore in less time, than in cases when allowance has to be made for the slopes on both sides, necessary in ordinary earthen walls. The *sap-roller* consists of two concentric gabions, one 4 ft., the other 2 ft. 8 inches in diameter, with the space between them wedged full of pickets of hard wood. In sapping (see MINES), these serve as substitutes for mantlets.—*Stuffed Gabions* are gabions rammed full of broken branches

GABLE—GABOON.

and small wood; being light in weight, they are rolled before soldiers in the trenches, and afford some, though not very efficient, protection against musketry fire.—*Gabionade* or *Gabbionnade*, -*nād*, is a line of gabions thrown up by troops as a defense, after being driven back from other more solid positions. In carrying a well-defended fortress, gabionade after gabionade has sometimes to be stormed before the besieged can be compelled to surrender.

GABLE, *n.* *gā'bl* [OF. *gable*—from mid. L. *gabūtum*, a gable: Goth. *gibla*, a pinnacle: Ger. *giebel*, the pointed end of a house: Dan. *garl*, a gable]: the triangular part of an exterior wall of a building, between the top of the side-walls and the two slopes of the roof. The whole wall of which the gable forms the top is called a gable-end; party-walls, or the walls which separate two contiguous houses, and which belong equally to both houses, are called in Scotland 'mutual gables:' see **PARTY-WALL**.

The gable is one of the most common and characteristic features of Gothic architecture. The end walls of classic buildings had *Pediments* (q.v.), which followed the slope of the roofs, but these were always low in pitch. In mediæval architecture, gables of every angle are used with the utmost freedom, and when covered with the molded and crocketed copes of the richer periods of the style, give great variety and beauty of outline.

Gablet, -*blēt*, a small gable. Gablets are used in great profusion in the more decorative parts of Gothic architecture, such as canopies, pinnacles, summits of niches or tabernacles, where they are introduced in endless variety with tracery, crockets, and other enrichments.

The towns of the middle ages had almost all the gables of the houses toward the streets, producing great diversity and picturesqueness of effect, as may still be seen in many towns which have been little modernized. The towns of Belgium and Germany especially retain this mediæval arrangement. In the later Gothic and the Renaissance periods, the simple outline of the gable became stepped and broken in the most fantastic manner: see **CORBIE STEPS**.

GABLOCK, *n.* *gāb'lōk* [from *gavelock*, a spear, a javelin]: a false spur of iron or steel fitted to the heel of a game-cock to make it more effective in fighting.

GABOON, *gā-bōn'*: estuary opening into the Atlantic, on the w. coast of Africa immediately n. of the equator; sometimes called G. river; and by different tribes on its shores, called Old Mpongwe and Aboka. About 18 m. wide at its mouth, it is about 7 m. wide at 40 m. inland; and then the G. proper may be said to end, and the Rio Olambo, 2 or 3 m. wide, begins. Into this Rio Olambo two considerable rivers discharge, known as Komo and Mbokwa, the former having the longer course. The navigation of the estuary is much encumbered by numerous reefs, shoals, and islets. The principal races in the G. country are the Mpongwé a branch of the Great Bantu stock, to which the Zulus belong, and the cannibal Fans (q.v.). The Mpongwé are among the most civilized of African native tribes, and are

GABRIEL—GABRIELLI.

keen traders; they are ludicrously vain and fond of finery. The warlike Fans are invaders from the e., and have rapidly increased in numbers in the country between the G. and the Ogobai. First visited by the Portuguese, the G. early became a great seat of the slave trade. 1840-45, a district on the G. became a French settlement, Libreville being the chief town. Before the Franco-German War 1870, the area of the French colony was given at 8,000 sq. m., pop. 186,000. The French never attached any importance to the colony till after Savorgnan de Brazza explored it in 1876-86. The area of the colony was estimated (1903) at 173,700 sq. m., and for administrative purposes the region was attached to the colony of Senegambia. There are numerous mission stations, Rom. Cath. and Protest.

GABRIEL, *gā'brī-ēl* (Heb. the man or mighty one of God): in the Jewish angelology, one of the seven archangels. He appears in the book of Daniel as the interpreter of the prophet's vision (chap. viii.), and announces the future appearance of the Messiah (ix. 21-27). In the New Testament, he reveals to Zacharias the birth of John the Baptist (Luke, i. 11), and to the Virgin Mary the birth of Christ (Luke. i. 26). According to the Rabbins, he is the angel of death for the people of Israel, whose souls are intrusted to his care. The Talmud describes him as the prince of fire, and as the spirit who presides over the thunder and the ripening of fruits. When Nebuchadnezzar besieged Jerusalem, G. is believed to have entered the temple, by command of Jehovah, before the Assyrian soldiery, and burned it, thereby frustrating their impious intentions. G. has also the reputation among the Rabbins of being a most distinguished linguist, having taught Joseph the 70 languages spoken at Babel, and, being in addition, the only angel who could speak Chaldee and Syriae. The Moham-medans hold G. in even greater reverence than the Jews, and regard him as the chief of the four most favored angels who form the council of God; he is called the spirit of truth, and is believed to have dictated the Koran to Mohammed. It should be observed that G. is nowhere in the Bible spoken of as an archangel: see **ARCHANGEL**.

GABRIEL-BELL: see **SACRING-BELL**.

GA'BRIEL CHAN'NEL: in the islands of Tierra del Fuego, between Dawson Island and Madalen Channel; lat. 54° 20' s., long. 70° 40' n. It is 25 m. long, 2 to 3 m. wide at the extremities, and narrower between those points. The coast on each side rises abruptly to a height of 1,500 ft., a glacier towers between the Sarmiento and Buckland Mountains, and the locality is swept by violent 'williwaws' or whirlwinds.

GABRIELITES, n. *gā'brī-ēl-īts* [named from *Gabriel* Scheeling, their founder]: sect of Anabaptists who existed for some time in Pomerania.

GABRIELLI, *gā-brē-ēl'lē*, **CATARINA**: 1730-96; b. Rome: vocalist. She was daughter of Count Gabrielli's cook, and possessing a remarkable voice was educated by Garcia and Porpora at the count's expense. She made her first ap-

pearance as an opera singer at Lucca 1747, and later became so popular as Dido in Jomelli's opera of that name, that she was engaged as prima for the Vienna opera 1750. She became the mistress of the infante Don Ferdinand in Parma, and was forced by his jealousy to flee to St. Petersburg, where she was cordially received by Empress Catharine II. and demanded 5,000 roubles per month for singing. Subsequently she returned to Italy, and in her last performances sang with her rival Marchesi in Milan, the event leading to serious disturbances between the friends of the singers.

GACHARD, *gă-shăr'*, LOUIS PROSPER: principal archivist of Belgium: b. in France about 1800. Originally a compositor, he removed to Belgium, took part in the revolution of 1830, and was naturalized 1831, and appointed keeper of the public records. His principal writings are, *Analectes Beligiques* (1830); *Documents Politiques et Diplomatiques sur la Révolution Belge de 1790* (1834); *Mémoires sur les Bollandistes et leurs Travaux depuis 1773 jusqu'en 1789* (1847); *Correspondance de Guillaume le Taciturne* (1847-51); *Correspondance de Philippe II., sur les Affaires des Pays-Bas* (1848-51); *Correspondance du Duc d'Albe sur l'Invasion du Comte Louis de Nassau en Frise* (1850); *Retraite et Mort de Charles-Quint* (1854), and *Relation des Troubles de Gand sous Charles-Quint* (1856). G. issued 1863, *Don Carlos et Philippe II.*; 1866, *Actes des Etats Généraux des Pays-Bas*; 1867, *Correspondance de Marguerite d'Autriche avec Philippe II.*; 1869, *Jeanne la Folle*; and *La Bibliothèque des Princes Corsini à Rome*.

GAD, n. *găd* [Icel. *gaddr*, a goad, a spike: Norw. *gadd*, a sharp point: prov. Dan. *gadd*, a prick: comp. Gael. *gath*, a sting]: in *mining*, a pointed wedge of a peculiar form, used to break up the ore under ground; a graver; in *OE.*, an arrow or spear head, a pointed knob, and the like: V. to ramble about without any fixed purpose, as cattle flying from the attack of the gad-fly. GAD'DING, imp.: ADJ. roving. GAD'DINGLY, ad. *-li*, in a gadding manner. GAD'DED, pp. GAD-FLY, fly that goads or stings cattle, and deposits its eggs in their skin (see BOT—BOT-FLY: TABANUS). GADABOUT, n., or GADDER, n. *găd'ër*, one who runs much abroad without business; a rambling tittle-tattler. GAD-STEEL, n. Flemish steel, so called from its manufacture into gads. UPON THE GAD, in *OE.*, upon a sudden; with undue or impetuous haste.

GAD, *găd*: first-born of Zilpah, Leah's maid, and seventh son of Jacob. His name is differently explained.—The tribe of Gad numbered in the wilderness of Sinai more than 40,000 fighting-men. Nomadic by nature, and possessing large herds of cattle, they preferred to remain on the e. side of Jordan, and were reluctantly allowed to do so by Joshua, on condition of assisting their countrymen in the conquest and subjugation of Canaan. Their territory lay n. of that of Reuben, and comprised the mountainous district known as Gilead, through which flowed the brook Jabbok: it touched the Sea of Galilee at its n. extremity, and extended e. to Rabbath-Ammor. The men

GADAMES—GADDI.

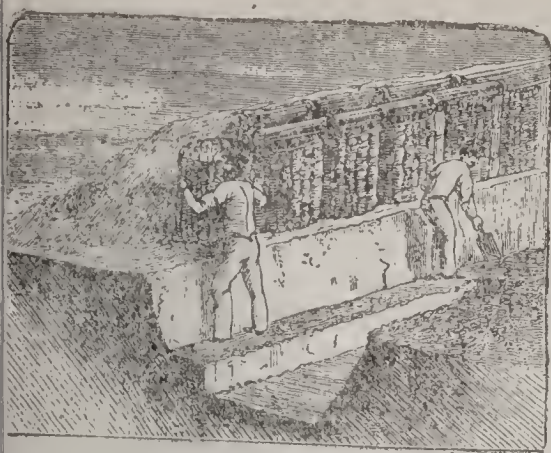
of Gad—if we may judge from the 11 warriors who joined David in his extremity—were a race of stalwart heroes. Jephthah the Gileadite, Barzillai, Elijah the Tishbite, and Gad ‘*the seer*,’ were in all probability members of this tribe.

GADAMES, more accurately GHADAMES, *gâ-dâ'mēs* or *gâ-dâms'* (the *Cydamus* of the Romans): oasis and town of Africa, the centre of divergent routes to Tunis, Tripoli, Ghat, and Tidikelt; on the n. border of the Sahara; lat. 30° 9' n. long. 9° 17' e.; on the s.w. boundary of the pashalic of Tripoli, 310 m. s.w. of the town of Tripoli. It contains six mosques and seven schools; but the education offered is limited to the reading of the Koran and a little Arabic writing. The gardens of G. grow dates, barley, wheat, millet, etc., and are watered by the hot spring (89° Fahr.), from which the town had its origin. The climate is dry and healthful, though very hot in summer. The revenue of G., estimated at 10,000 mah-boobs (abt. \$8,250), is derived from annual tributes levied on property, and from customs dues and tolls. It is an important entrepôt for manufactures and foreign goods from Tripoli to the interior, and for exports of ivory, bees-wax, hides, ostrich-feathers, gold, etc., from the interior to Tripoli. Previous to 1856, about 500 slaves, principally women, were annually imported at G.; but in that year the sultan, peremptorily forbade the traffic. Pop. abt. 7,000, devoted Mohammedans.

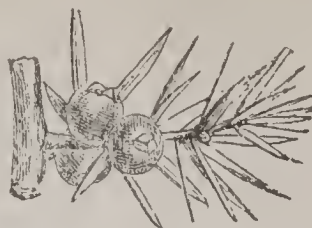
GADARA, *găd'a-râ*: one of the 10 cities of the Decapolis (q.v.), and ancient cap. of Peræa, often mistaken for Gerasa; 8 m. s.e. of Lake Tiberias; on a hill s. of the Hieromax. Polybius chronicles its capture by Antiochus the Great, B.C. 218, and declares it the strongest of all the cities in that part of the country. It was fortified with unusual skill, contained a court of justice, and had numerous hot baths and medicinal springs in its vicinity. Vespasian captured and reduced it to ashes, and its ruins, called in Arabic *Um Keis*, cover a space nearly 2 m. in circumference. These ruins indicate that G. was once a place of great splendor. The ancient pavement of the chief thoroughfare has been pronounced a marvel of construction and beauty. Remains of tombs excavated in limestone rock show chambers 20 ft. sq., with numerous recesses in the sides, which are now occupied by the inhabitants as domiciles. G. was once the seat of a bp., but lost its prestige after the Mohammedan conquest.

GADDEE, or GADDI, or GUDDEE, n. *găd'dē* [Hind.]: a rajah's throne; a cushion; a seat.

GADDI, *găd'ē*, AGNOLO: painter: abt. 1324–1390; b. Florence, Italy; son of Taddeo G. He was educated by his father, and became equally eminent as painter and mosaist, but passed the latter part of his life in mercantile business in Venice. His best preserved works are in the chapel of the Holy Girdle in the cathedral of Prato, and in the choir of Santa Croce at Florence, the latter illustrating the serial history of the Holy Cross, with many allegorical allusions. He was a bold colorist, but poor in drawing.



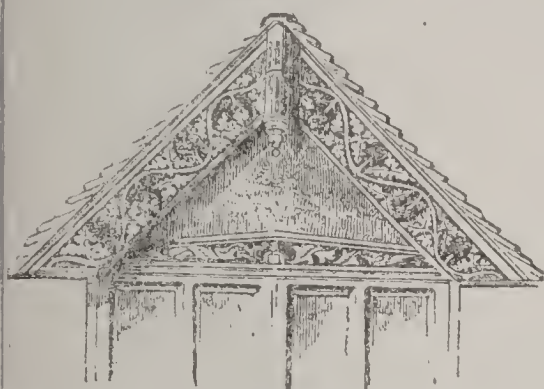
Part of Trench, with Gabions and Fascines.



Galbulus (fruit of *Juniperus communis*).



Gadidae.—Common Cod-fish (*Gadus morrhua*): *v*, Ventral fins, pointed, and placed near the pectoral; *p*, Pectoral fin.



Wooden Gable of Sixteenth Century, at Coventry.



Galeated Calyx of *Aconitum variegatum*.



Galago Monteiri.

and nearly all his works make their best impression at some distance. As a composer he was considered superior to his father, and more dignified.

GAD'DI, GADDO: 1239–1312; b. Florence: painter and mosaist. He is believed to have executed the great mosaic within the portal of the cathedral of Florence, representing the coronation of the Virgin, and the mosaics within the portico of the church of S. Maria Maggiore at Rome, illustrating the legend of the founding of that church. It is known that he executed the mosaics of the choir and the front of the first cathedral of St. Peter, in Rome, the latter representing God the Father on a colossal scale and with many figures; also an altar-piece in the church of St. Maria Novella, in Florence. The two first sets above no longer exist, and there is a doubt whether any of his paintings, beyond mosaics, are extant. He was very successful both artistically and financially, and laid the foundation of the future great wealth of the family.

GAD'DI, TADDEO: painter: 1300–66; b. Florence; son of Gaddo G. He was held at the baptismal font by Giotto, became the asst. and favorite of that master, and adopted his general style of painting. At times he was a painter, mosaist, architect, and merchant. Giotto removed to Naples 1330, and G. is supposed to have begun painting on his own account about that time. His works include the frescoes in the Baroncelli chapel of the church of S. Croce, Florence, representing the Virgin and Child between Four Prophets, incidents in the legend of the Virgin from the expulsion of Joachim from the Temple to the Nativity, and the eight virtues. An altar-piece, the Virgin and Child, dated 1334, is in the Berlin Museum; a triptych (1336) of the Virgin and Four Saints, the Baptism of Jesus, and his Descent from the Cross, is in the Naples Gallery; and an altar-piece of the Virgin and Child surrounded by Angels (1355) is in the sacristy of S. Pietro a Megognano. His best mosaic work extant is in the baptistery of Florence, and his architectural genius was shown in plans for the original Ponte S. Trinita, the present Ponte Vecchio, and the church of Orsan-Michele.

GADE, *gá'déh*, NIELS WILHELM: 1817, Feb. 22—1890, Dec. 21; b. Copenhagen; composer. He became an accomplished performer on the violin and piano, then turned his attention to composition, and with his overture *Echoes of Ossian* won the prize of the Copenhagen Musical Union and a royal grant by which he was enabled to travel and study abroad 1841. While in Italy he composed a noted symphony in C minor, and 1844 was called to Leipsic to direct the Gewandhaus concerts in place of Mendelssohn. In 1848 he was appointed organist, director of music, and master of the chapel royal at Copenhagen; 1874 was elected a foreign member of the Berlin Acad. of Arts, 1876 was voted by the Danish Folkething a life pension of 3,000 crowns, and 1878 was elected a corresponding member of the French Institute. Besides prize compositions he has written five symphonies, a quintette, an octette, numerous romances, overtures, and sonatas, a lyrical drama, *Comala*, a religious

GADIDÆ—GADSDEN PURCHASE.

cantata, *The Crusaders*, an opera, *Nibelungen*, *Erl King's Daughter*, and *Springtide Phantasy*.

GADIDÆ, *găd'î-dē*: important family of malacopterous fishes, having a moderately elongated body covered with small soft scales, the head naked, all the fins soft and destitute of spines, the ventral fins placed under the throat and pointed, one dorsal fin or more, the air-bladder large. Some of the species are small, others attain a large size. To this family belong the Cod, Ling, Hake, Dorse, Had-dock, Whiting, Coal-fish, Burbot, etc. The species are widely distributed. Most of them are marine: a few, as the Burbot, are fresh-water fishes: for the more important, see the several titles.

GADINIC, a. *găd-în'îk* [L. *gadus*, a codfish]: derived from or in any way pertaining to the *Gadidæ*. **GADINIC ACID**, crystalline, fatty acid, obtained by cooling the turbid residue of cod-liver oil to 5°. It melts at 63°.

GADITANIAN, a. *găd-î-tă'nî-an* [L. *Gaditanus*—from *Gades*, Cadiz]: of or pertaining to Cadiz, Spain: N. native or inhabitant of Cadiz.

GADJATCH, *găd-yăтч'*, or **GADITCH**, *gă-dîтч'*: town of S. Russia, province of Poltava, 65 m. n. by w. from the town of Poltava. It has seven churches and a monastery, and an active trade in agricultural produce. Pop. 8,110.

GADOLINITE, n. *găd-ôl'în-îl* [after the Russian chemist *Gadolin*]: a silicate of yttria found in Sweden in imperfect green crystals, and in amorphous masses in granite.

GADSDEN, *gădz'den*, **CHRISTOPHER**: 1724–1805, Aug. 28; b. Charleston, S. C.: statesman. He was educated in England, and on his return engaged in mercantile business in Philadelphia with success. He was a delegate to the first colonial congress 1765, and the first continental congress 1774, entered the army as senior col. of S. C. militia at the beginning of the revolutionary war, became brig. gen. 1775, took part in the defense of Charleston 1776, and was one of the framers of the state constitution 1778. In 1779 he resigned his commission in the army, 1780 as lieut. gov. of S. C. signed the capitulation of Charleston, and in violation of its terms was soon afterward arrested with 77 other leading citizens, and refusing parole, was confined in Fort Augustine 45 weeks. On being exchanged 1782 he was elected gov., but declined on account of age.

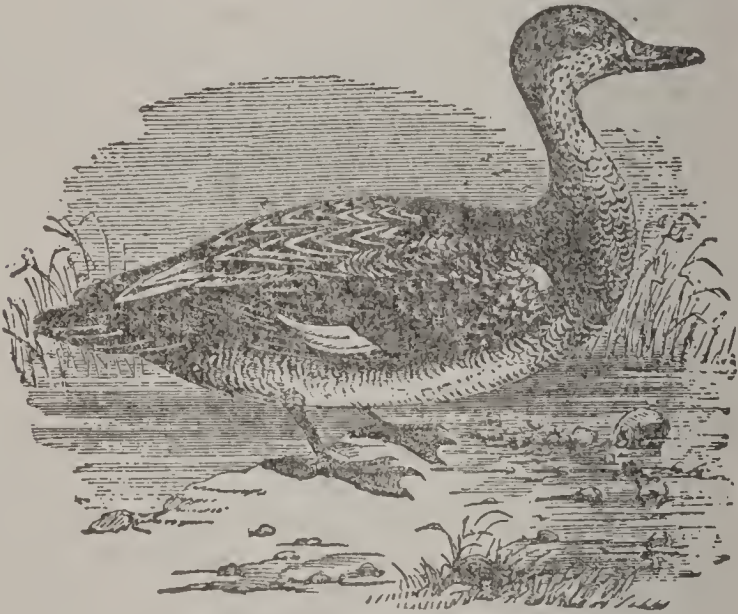
GADS'DEN, **CHRISTOPHER EDWARDS**, D.D.: 1785, Nov. 25—1852, June 24; b. Charleston; grandson of Christopher G.: bp. of the Prot. Episc. Church. He studied in the Associate Acad., Charleston, graduated at Yale College 1804, was ordained deacon 1807, July 25; priest 1810, Apr. 14; and was elected asst. rector of St. Philip's Church, Charleston, 1810, Feb.; succeeding to the rectorship 1814. In 1840, June 21, he was consecrated Bp. of S. C. He edited the *Gospel Messenger* several years, and beside sermons, charges, and essays, published *The Prayer-Book as It Is*. He received the degree D.D. from South Carolina College 1815.

GADS'DEN PURCHASE: strip of territory comprising 45,535 sq. m. in Arizona and New Mexico s. of the Gila

GADWALL—GÆA.

river, purchased from Mexico for the United States by Gen. James Gadsden, grandson of Christopher G. (1788, May 15—1858, Dec. 25), through the treaty of 1853, Dec. 30, which greatly modified the provisions of that of Guadalupe Hidalgo. It was agreed that the United States should pay Mexico \$10,000,000 for the territory embraced within the new boundary-line, and that Mexico should renounce claims against the United States on account of Indian depredations variously estimated at from \$15,000,000 to \$30,000,000. The U. S. senate greatly modified the treaty before adopting it, a revolution and the retirement of Gen. Gadsden from his post as minister to Mexico intervened before its conclusion, and Pres. Santa Anna was banished as a traitor because of the unpopularity of the measure in Mexico.

GADWALL, *gād'wawl* (*Anas strepera*, or *Chauliodus strepera*): species of duck, not quite so large as the mallard, abundant in many parts of the continent of Europe, and in Asia, and in N. America. It is found also in n. Africa. Being a bird of passage, it is a native both of arctic and of



Gadwall (*Anas strepera*).

tropical regions. The G. breeds in marshes, and lays from seven to nine eggs. Except at the breeding season, it is usually seen in small flocks, and an individual is sometimes found in a flock of other ducks. Its voice is loud and harsh. It is much esteemed for the table.

GÆA, *jē'a*, or GÆ, *jē*, in Greek mythology: the goddess of the earth; appearing in Hesiod as the first-born of Chaos, and mother of Uranus, Pontus, and many other gods and titans. As the vapors which were supposed to produce divine inspiration rose from the earth, it was natural that G. should be regarded as an oracular divinity; and, in fact, the oracles at Delphi and Olympia were believed to have belonged to her in the earlier ages of their history. Her worship extended over all Greece, and she had temples or altars in most of the important cities. At Rome G. was worshipped under the name of *Tellus*.

GAELIC, n. *gá'lik* or *gá'lik* [Gael. *Gaidheal*, a Highlander: W. *Gwyddyl*, Irishmen]: the language of the Highlanders of Scotland; a division of the Celtic language: **ADJ.** pert. to the Scottish Highlanders or their language. **GAEDHELIC**, n.a. *gá'lik*, the division of the Celtic languages which comprises the Irish, Gaelic, and the Manx.

The term *Gaelic* (Gwyddelian, or Gaedhelic, or Gadhelic) as applied to *language* and *literature* is used in two senses. In its wider signification, it designates the n. branch of the Celtic languages, comprehending the Irish, the Highland Scottish, and the Manx: see **CELTIC NATIONS: IRISH LANGUAGE AND LITERATURE**. In its narrower signification (the usual term being *Gaelic*) it designates the Highland-Scottish dialect, known also as Erse or Irish. W. F. Skene, one of the latest and best informed writers on the subject, holds that the differences between the language spoken by the Scotch Highlanders and the language spoken by the native Irish are (1) 'partly in the *pronunciation*, where the accentuation of the language is different, where that peculiar change in the initial consonant, produced by the influence of the previous word, and termed by the Irish grammarians *eclipsis*, is unknown except in the sibilant, where the vowel sounds are different, and there are even traces of a consonantal permutation; (2) partly in the *grammar*, where the Scottish Gaelic prefers the analytic form of the verb, and has no present tense, the old present being now used for the future, and the present formed by the auxiliary verb, where the plural of one class of the nouns is formed in a peculiar manner, resembling the Anglo-Saxon, and a different negative is used; (3) partly in the *idioms* of the language, where a greater preference is shown to express the idea by the use of substantives, and the verb is anxiously avoided; and (4) in the *vocabulary*, which varies to a considerable extent, where words now obsolete in Irish are still living words, and others are used in a different sense.'—*The Dean of Lismore's Book*, introd. pp. xiv. xv. (Edin. 1862).

The origin of the differences thus described is still in dispute. Mr. Skene contends that they are ancient, and enter into the organization of the language. The Irish scholars on the other hand, hold that they are comparatively modern and unimportant, and little more than provincial corruptions of the mother-language of Ireland. The late Mr. Richard Garnett, one of the most learned of English philologists, is on the Irish side, holding 'that Irish is the parent tongue, that Scottish Gaelic is Irish stripped of a few inflections, and that Manx is merely Gaelic with a few peculiar words, and disguised by a corrupt system of orthography;' and, again, that the language of the Scottish Highlands 'does not differ in any essential point from that of the opposite coast of Leinster and Ulster, bearing, in fact, a closer resemblance than Low German does to High German, or Danish to Swedish.'—*Philological Essays*, pp. 202, 204 (Lond. 1859). That the north of Ireland, and the Scottish Highlands, and West Islands, were, at an early period, peopled by the same race, or races, is admitted on both sides. Mr. Skene further admits, that from about the

middle of the 12th c. to about the middle of the 16 c., Ireland exercised a powerful literary influence on the Scottish Highlands; that the Irish sennachies and bards were heads of a school which included the West Highlands; that the Highland sennachies were either of Irish descent, or, if they were of native origin, resorted to bardic schools in Ireland for instruction in the language and the accomplishments of their art; that in this way the language and literature of the Scottish Highlands must have become, by degrees, more and more assimilated to the language and literature of Ireland; and that it may well be doubted whether, toward the middle of the 16th c., there existed in the Scottish Highlands the means of acquiring the art of writing the language except in Ireland, or the conception of a written and cultivated literature, which was not identified with the language and learning of that island. Mr. Skene holds, at the same time, that a vernacular Gaelic, preserving many of the independent features of a native language, existed among the Scottish Highlanders as a spoken dialect; and that a popular and unwritten literature existed in that native and idiomatic Gaelic, in the poetry handed down by tradition, or composed by native bards without any extraneous education in the written language of Ireland.

The first books printed for the use of the Scottish Highlanders were a translation of Knox's Prayer Book 1567, by John Carsewell, Bp. of the Isles; translation of Calvin's Catechism, 1631; translation of the Psalms of David, begun 1659, completed 1694; and translation of the Bible, published by the Rev. Robert Kirke, minister of Balquhider, 1690. All these works are in the Irish orthography and Irish dialect; the last mentioned work, indeed, is nothing more than a reprint of Bp. Bedell's Irish version of the Bible, with a short vocabulary of Scottish Gaelic words, to adapt it to the use of the Scottish Highlanders. The first translations into the Scottish Gaelic were of Baxter's *Call to the Unconverted*, published 1750; of the Psalms of David, 1753, 87, and 1807; of the New Testament, 1767, 96; of Aleine's *Alarm*, 1781; of the old Testament, 1783-87 and 1820; and of the Old and New Testaments, 1826. Vocabularies of the Scottish Gaelic were published 1690, 1702, 41, 95, and 1815. The first Dictionary, by R. A. Armstrong, appeared 1825; the largest and best was published under the auspices of the Highland Society of Scotland, in two quartos, 1828. The best grammar is that of the Rev. Alexander Stewart, minister at Dingwall, published 1801, reprinted 1812.

The oldest specimen of the written language connected with Scotland is the *Book of Deer* (see DEER), compiled in the 12th century. The written language had, however, disappeared in Scotland during the next three centuries, as the oldest collection of *poetry* in the Scottish Gaelic, preserved in *The Dean of Lismore's Book* (compiled 1511-51; by Sir James Macgregor, vicar of Fortingall, and Dean of Lismore), is written phonetically: it is now in the Advocates' Library at Edinburgh. Selections from it have been

published at Edinburgh (1862), with translations by the Rev. Thomas M'Lauchlan, as well into English as into modern Scottish Gaelic, and with a preliminary dissertation by W. F. Skene. The volume contains nine pieces ascribed to 'Ossian, the son of Finn,' who speaks of himself as contemporary with St. Patrick, and pieces by later and less known writers. The literary merit of the compositions is very small.

The bibliography of the scanty literature of the Scottish Gaelic is given in Reid's *Bibliotheca Scoto-Celtica* (Glasg. 1832). As an exposition of the philology of the Gaelic language, and as an introduction to Gaelic literature and the Ossianic controversy, the English reader will find Prof. Blackie's *Language and Literature of the Scottish Highlands* (1876) an interesting, instructive, and impartial guide. The traditional prose literature of the language has been collected and illustrated by Mr. J. F. Campbell of Islay, in four pleasing volumes, *Popular Tales of the West Highlands* (Gaelic and English 1862). In 1881, a *Collection of Gaelic Proverbs* was issued by Sheriff Nicholson.

Mr. Skene has very clearly and fairly stated the long-disputed question as to the authenticity of the famous Poems of Ossian, published first in English, afterward in Gaelic, by Mr. James Macpherson. The conclusions arrived at are: 1. That the characters introduced into Macpherson's poems were not invented by him, but were really the subjects of tradition in the Highlands; and that poems certainly existed which might be called Ossianic, as relating to the persons and events of that mythic age. 2. That such poems though usually either entire poems of no very great length, or fragments, had been handed down from an unknown period by oral recitation, and that there existed many persons in the Highlands who could repeat them. 3. That such poems had likewise been committed to writing, and were to be found to some extent in manuscripts. 4. That Macpherson had used many such poems in his work; but by joining separated pieces together, and by adding a connecting narrative of his own had woven them into longer poems. See OSSIAN, POEMS OF.

The census of 1881 showed that in Scotland, out of a pop. of more than 3½ millions, 231,602 still spoke Gaelic, which is gradually losing ground. In Glasgow the number was 8,517. A few years ago Gaelic was in use in the public services of abt. 180 out of the 1,000 congregations of the Church of Scotland. Between 1874-82, Prof. Blackie succeeded in raising £14,000 for endowing a Celtic chair in the Univ. of Edinburgh.

GAETA *gá-ā tá* (Cajeta of the Latins): strongly fortified maritime town of s. Italy, province of Caserta; picturesque situated on an abrupt promontory projecting into the Mediterranean, and connected with the mainland by a low and narrow isthmus protected by solid walls. On the summit of the promontory stands the circular tower D'Orlando, said to be the ancient mausoleum of Lucius Munatius

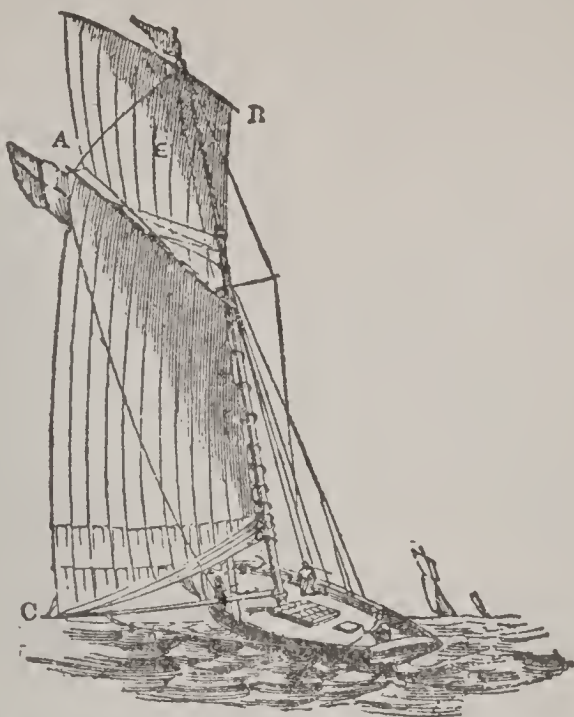
Plancus, friend of Augustus. The beauty of the bay of G., which almost rivals that of Naples, has been celebrated by Homer, Virgil, and Horace. Cajeta, ancient name of G. derived its origin, according to Virgil, from its being the burial-place of Cajeta, the nurse of Æneas. On the dismemberment of the Roman empire, G. became a centre of civilization and commercial prosperity, and gained still more importance after the decadence of the eastern empire. In the growth of this early municipality was foreshadowed the commercial life and grandeur of the later Italian republics. Both in ancient and modern times, G. has sustained remarkable sieges, and recently it has been the theatre of several interesting events. In 1848, it became the refuge of Pope Pius IX., when the revolution at Rome compelled him to retire. In 1860, after the defeat of the Neapolitans on the Volturno by the forces of Garibaldi, G. was the last stronghold of the Bourbon dynasty of Naples, and after a protracted siege surrendered to Gen. Cialdini. Many interesting classic remains have been found in G., including a fine marble vase by the Athenian sculptor Salpione. The vicinity abounds in remains of Roman villas, etc. The citadel, which is of great strength, contains in its tower the tomb of the Constable Bourbon, killed at the taking of Rome 1527. The inhabitants of G. derive their chief profits from the fisheries and their coasting-trade in oil, wine, and fruit—principal productions of the surrounding country. Pop. abt. 18,000.

GÆTULIA, *jē-tū'li-a*: ancient country of Africa, s. of Mauritania and Numidia, and embracing the w. part of the desert of Sahara. Its inhabitants belonged to the great aboriginal Berber family of n. and n.w. Africa; they were not in general black, though a portion of them dwelling in the extreme s., toward the Niger, had approximated to this color through intermixture with the natives and climatic causes, and were called *Melanogætuli*, or 'Black Gætulians' (see Ptol. iv. 6, s. 16). The Gætulians were savage and warlike. They came into collision with the Romans for the first time during the Jugurthine war, when they served as light-horse in the army of the Numidian king. Cornelius Cossus Lentulus led a force against them, and for his success obtained a triumph and the surname of Gætulicus (A.D. 6). The ancient Gætulians are believed to be represented in modern times by the Tuaricks or Tawár-eks.

GAFF, n. *gǽf* [Dan. *gaffel*; Ger. *gabel*, a fork: OF. *gaffe*, an iron hook, a boat-hook: Ir. *gaf*, a hook]: in a ship or boat, spar or a sort of boom to which the head of a fore-and-aft sail is bent, such sail having its foremost side made fast by rings to the mast, and its lower edge, in most instances, held straight by the boom proper. The thick end of the gaff is constructed with 'jaws' to pass half round the mast, the other half being inclosed by a rope; this serves to keep it close when the sail is hoisted or lowered. A gaff, with the sail called 'driver' or 'spanker,' and the gaff-tonsail.

GAFFER—GAGE.

which is a small sail carried on the topmast above the gaff, are shown in the accompanying illustration. *Gaff* denotes



A, Gaff ; B, Gaff-topsail-yard ; C, Boom ; D, Sheet ;
E, Gaff-topsail.

also a long hook used for landing salmon: V. to land a salmon with such a hook. GAF'FING, imp. GAFFED, pp. *găft*.

GAFFER, n. *găf'fēr* [a probable contr. of *goodfather* or *grandfather*: prov. Eng. *gramfer*]: a word formerly applied to an aged man in humble life; a name given to a foreman or oversman.

GAFFLES, *găf'lz*: the levers by means of which cross-bows were bent.

GAG, n. *găg* [imitative of sounds uttered while suffering from an impediment or imperfection in the organs of speech: Swiss, *guggen*, to stutter: Gael. *gagach*, stuttering—from *gag*, an impediment]: something put into the mouth to hinder speaking: V. to hinder speaking by thrusting something into the mouth, or in any other way. GAG'GING, imp. GAGGED, pp. *găgd*. GAG-REIN, n. rein attached to the throat-latch, to draw the bit up into the corners of the horse's mouth when pulled upon. GAG-TOOTH, a projecting tooth.

GAG, n. *găg* [Gael. *gag*, a chink, an opening, an impediment]: in *slang*, certain words introduced by an actor in a theatre into his part to suit a particular purpose, as to pander to some popular fashion or folly.

GAGE, n. *găj* [F. *gage*, a pledge—from mid. L. *vādūm*, pawn or pledge, allied to *wage*, *wager*]: a pledge or security; a glove or cap, etc., thrown to the ground as a pledge to sustain an affirmation or a cause, as a 'wager of battle,' or as a challenge—to be redeemed by mortal combat: V. to pledge; to wager. GA'GING, imp. *-ňng*. GAGED, pp. *-găjd*,

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pledged; bound. ESTATE IN GAGE, in old English law was of two kinds: *vivum vadium* (the most ancient), where an estate in land was given to a lender as security, to remain in his hands till he had made good the sum lent from the profits of the land (see WADSET): and *mortuum vadium* (mort-gage): see MORTGAGE.

GAGE, in *weather-gage*: the windward of a ship: see WEATHER-GAGE.

GAGE (to measure): see GAUGE.

GAGE, *gāj*, LYMAN J.: statesman: 1836, June 28 —————; b. at De Ruyter, Madison co., N. Y. He was educated at Rome Acad. 1846–50, entered the Oneida Central Bank as clerk 1853, and in 1855 worked in a Chicago lumber yard. In 1858, he became bookkeeper of the Merchants' Savings, Loan, and Trust Co., Chicago, and rose to cashier 1861. In 1868, he entered the First National Bank of Chicago as cashier, and was appointed pres. of that institution 1891, July 1. He was first pres. of the Columbian Exposition Company 1890, and of the Chicago Civic Federation, which led to municipal reform, 1894–5. In 1897 Pres. McKinley appointed him sec. of the treasury of the United States.

GAGE, *gāj*, THOMAS: English general: d. 1787. In 1760 he became gov. of Montreal, and 1763 commander-in-chief of the British forces in America. His inflexible character led the govt. to regard him as well fitted to end the disturbances in the American colonies. In 1774, he was nominated gov. of Massachusetts, a post of peculiar difficulties. Appointed to carry out those rigorous decrees of parliament which ultimately alienated the colonies from the mother country, he proceeded to enforce them, but in such a manner as only tended to widen the gulf of separation, and drive matters to a climax. 1775, Apr. 18, he despatched an expedition to seize a quantity of arms stored at Concord, Mass. On the way thither the detachment came upon a number of militia drilling, whom they attacked because they refused to lay down their arms. This encounter, known as the battle of Lexington, was the signal for a general rising throughout the states. On June 17 the battle of Bunker Hill was fought, which resulted in a dearly bought victory to the English; but numerous complaints being lodged against G., he was recalled by the British government 1775, Oct. He then returned to England, where he died.

GAGEA, n. *gāj'ê-a* [named after Sir Thos. Gage, a British botanist]: genus of *Liliaceæ*, tribe *Tulipeæ*.

GAGERN, *gâ'gern*, HEINRICH WILHELM AUGUST, Freiherr von: 1799, Aug. 20—1880, May 22; b. Baireuth. He was educated in Munich and studied law at Heidelberg, Göttingen, Jena, and Geneva. He was elected a member of the second chamber of the Grand Duchy of Hesse 1832, and vigorously opposed the politics of the governments and of the federal diet. In 1836 he declined re-election, and turned to agriculture. In 1846, G. published a work against the govt. of electoral Hesse, and was re-elected to the chamber as representative of Worms 1847. His return

GAGGLE—GAIN.

to public life gave great impulse to liberal politics, and he became inseparably connected with the German movement of 1848. He endeavored to promote the representation of the German people in the Frankfort diet; was the most prominent delegate in the preparatory convention (*das Vorparlament*) from the German states at Frankfort, Mar. 31; and on the meeting of the parliament, May 28 (see GER-MANY), he was appointed president, and later to the perpetual presidency. G., unable to sympathize with the violence of the democratic party, and to agree with the governments, abandoned the movement 1849, May 20. In 1850 he served in the Slesvig-Holstein war, after which he retired to the Monsheim estate, which had come into his possession. In 1852, he removed to Heidelberg and published the life of his brother, Gen. Friedrich von Gagern.

GAGGLE, v. *gäg'l* [Dut. *gaggelen*; Ger. *gackeln*, to make a noise, as a goose]: to make a noise like a goose. **GAG'-GLING**, imp. *-glīng*: **ADJ.** silly; noisy and foolish. **GAG-GLED**, pp. *gäg'ld*.

GAIANITES, n. *gā'an-īts*: in *chh. hist.*, branch of the Eutychians, followers (about 537) of Gaian, Bp. of Alexandria.

GAIETY and **GAILY**: see under **GAY**.

GAIL HAMILTON: see **DODGE, MARY ABIGAIL**.

GAILLAC, *gāh-yāk'*: town of France, dept. of Tarn, on the right bank of the river Tarn, in a fertile vine-growing district, 32 m. n.e. of Toulouse. It is ill built, and has no public building of any importance except the communal college. Distilling, tanning, ship-building, and a brisk trade in wine and brandy, are carried on. Pop. 7,000.

GAILLARD, *gā-yâr'*, **GABRIEL HENRI**: 1726, Mar. 26—1806, Feb. 13; b. in the village of Ostel, near Soissons: French historian. He was educated for the bar, but soon turned to literature, and later to history exclusively. His first work was *Essai de Rhétorique Française à l'Usage des jeunes Ddemoiselles*, etc. (1745); followed by *Poétique Française à l'Usage des Dames*. In 1757 appeared *Histoire de Marie de Bourgogne, Fille de Charles le Téméraire*; 1766, *Histoire de François I.*; 1782, *Histoire de Charlemagne, précédée de Considerations sur la première Race, suivie de Considerations sur la seconde Race, et contenant l'Éloge du Premier Presiden de Lamoignon*. His *Histoire de la Rivalité de la France et de l'Angleterre* (1771-77) (which procured his admission into the French Acad.), and *Histoire de la Rivalité de la France et de l'Espagne*, are deemed by English critics, diffuse, one-sided, and rhetorical. G. was author of many other works.

GAILLONELLA, n. *gāl-lo-ně'lla* [named after the algologist *Gaillon*]: genus formerly held to belong to the infusoria, but now ranked with plants.

GAIN, n. *gān* [Icel. *gagn*, gain, advantage: Sw. *gagn*, benefit, profit: OF. *gagner*; F. *gagner*, to gain or earn—applied primarily to what was obtained from the ground by labor or by the feeding of cattle: Prov. *ganh*, gain, profit: comp. Gael. *gìn*, to generate, to cultivate]: profit; advantage obtained; interest; *V.* to get, as profit or advantage; to ob-

GAINES—GAINES'S MILL.

tain by effort; to procure; to have profit or advantage; to reach or arrive at. GAIN'ING, imp. GAINED, pp. *gānd*. GAINS, n. plu. *gānz*, earnings, etc. GAIN'FUL, a. *-fūl*, profitable; advantageous. GAIN'FULLY, ad. *-li*. GAIN'FULNESS, n. GAIN'GIVING, n. *-giv-ing*, in *OE.*, return; misgiving. GAIN'LESS, a. bringing no advantage. To GAIN GROUND, to advance in any undertaking; to prevail. To GAIN'OVER, to draw to another party or interest. To GAIN ON or UPON, to encroach on; to get the better of.—SYN. of 'gain, v.': to acquire; obtain; win; earn; attain; get; achieve; conciliate; reach; arrive at;—of 'gain, n.': emolument; lucre; advantage; benefit; acquisition; accumulation.

GAINES, *gānz*, EDMUND PENDLETON: 1777, Mar. 20—1849, June 6; b. Culpepper co., Va.: soldier. He was appointed 2d lieut. 6th U. S. inf. 1799, Jan. 10; promoted 1st lieut. 1802. Apr., capt. 1807; resigned from the army 1811; returned and was appointed maj. 1812, Mar. 24; promoted col. 1813, brig.gen. 1814, Mar. 9; and brevetted maj.-gen., and received the thanks of congress and a gold medal for his defense of Fort Erie, 1814, Aug. In 1816 he was appointed a commissioner to treat with the Creek Indians, 1817 commanded the s. milit. dist., and began the operations against the Creek and Seminole Indians which resulted in the acquisition of Fla. by the United States; 1836 was engaged against the Seminoles and was severely wounded. He was active in the early part of the Mexican war.

GAINES, MYRA CLARK: wife of Gen Edmund P. G.: 1805–1885, Jan. 9; b. New Orleans: litigant. She was a daughter of Daniel Clark, who emigrated from Ireland to New Orleans, and inherited his uncle's property there 1799. He was supposed to have lived a bachelor, but it was known that he was the father of two daughters by a French woman of great beauty. He died 1813, and his will (1811, May 20) gave his property to his mother. In 1830 letters were found that detailed the circumstances of Myra's birth, and 1832 one that gave an account of a will made by her father 1813, in which he acknowledged her as his legitimate daughter and bequeathed her all his property. She then began her remarkable litigation, first to establish her legitimacy, then to secure her father's estate. From statements of her father to friends declaring her legitimacy and the testimony of others to whom he had shown his will, giving her his property, shortly before his death, the supreme court of La. pronounced her legitimate and his lawful heir 1856, Feb. 18. Subsequently the U. S. supreme court decided that the facts of her father's secret marriage in Philadelphia and her own legitimacy were fully established. Then began the struggle to secure possession of the estate. She filed a bill in equity in the U. S. supreme court 1856, and a favorable decision was rendered 1867. In 1861 the property in New Orleans was valued at \$35,000,000, and previous to 1874 she obtained \$6,000,000. Appeals and counter suits were in progress at the time of her death. She married W. W. Whitney 1832, and at his death Gen. Edmund P. G. 1839.

GAINES'S MILL, BATTLE OF (OR FIRST BATTLE OF

GAINES'S MILL.

COLD HARBOR—called also, BATTLE OF THE CHICKAHOMINY); between the Union and the Confederate troops, 1862, June 27. Shortly after the battle of Fair Oaks (q.v.), 1862, May 31, in which Gen. Johnston received a mortal wound, Gen. Lee succeeded to the command of the Confederate army operating in Va., and by July 1 had an effective force of nearly 100,000 men. By repeated reinforcements the Union army under Gen. McClellan had been increased to 156,318, of whom he reported (June 26) 115,102 'present for duty.' On assuming chief command Gen. Lee proceeded to carry out the plans of his predecessor, and undertook to gather an army about Richmond strong enough to crush the Union force then on the n. side of the Chickahominy river. By June 25 Gen. McClellan had constructed 11 bridges across the Chickahominy, transferred the bulk of his army to the s. side, leaving Gen. Porter with 27,000 men on the n. side, and strengthened his position by intrenchments. A picket advance on the left was ordered, preliminary to an attack upon the Confederates to be made by Gen. Franklin with the support of Gens. Heintzelman and Sumner on the 26th and 27th, and McClellan appeared satisfied with the results. But he soon received information which misled him as to the enemy's strength, and believing himself largely outnumbered and liable to attack on the 26th, made preparations to hold his present position. His intention of attacking Lee was now forestalled by Lee's ordering Gen. Hill to assault Gen. Porter's position on the n. side of the river. Hill carried out his instructions on the 26th, and though Porter was forced to fall back from Mechanicsville he successfully repulsed every charge of the Confederates. After this engagement, McClellan, convinced that Lee purposed cutting off the Union army from its base of supplies, controlling its communications, and isolating the entire force, determined to transfer his base to the James river. By his orders quartermaster's stores were hastened to Savage Station and to convenient points on the James, Gen. Porter's corps was withdrawn from its position and placed around the bridges and within supporting distance of the main army during the night 26th-27th, while the greater part of the trains and heavy guns were removed to the right bank. In posting Porter on the heights between Cold Harbor and the Chickahominy, McClellan proposed engaging the Confederates under Gen. Jackson till he had gained time to make the change of base. But at daylight on the 27th the Confederates became aware of Porter's withdrawal and started in pursuit. At noon a short engagement was fought at Gaines's Mill. At 2 P.M. Hill reinforced by Jackson advanced upon the Union army in the direction of Cold Harbor, but was repulsed by Gen. Sykes. Lee then ordered Longstreet forward to relieve Hill and make a demonstration on the Union left. That officer, however, believing a feint useless, attacked in force. Jackson reached the Union right about the same time, and Hill was advancing in the same direction. Within a few minutes an attack was made along the whole Union line, and by 3 o'clock the battle was so severe that both the second

Union line and the reserves were ordered forward to support the first line. The disposition of Porter's corps was on the line of an arc of a circle, with Morell's division on the left, Sykes's on the right stretching to the rear of Cold Harbor, McCall's forming the second line, and Cooke's cavalry behind a hill in the rear. Within half an hour Porter had to call for assistance. Slocum's division was sent forward, increasing Porter's force to 35,000 men. At 5 o'clock Porter's situation became critical, and French's and Meagher's brigades went to his support. The right of the line repulsed all attacks, but the left began to waver, and soon gave way. Porter then opened fire with all his artillery and under its cover began withdrawing his men and checking the enemy's advance, while Cooke with his cavalry charged the Confederate left. The enemy opened a terrific fire on the cavalry, which threw the horses into a panic and created great disorder. Seeing this, the Confederates charged the crest of the hill, captured 14 guns, and drove the Union left to the river. The right of the line, which had resisted all attempts of the Confederates to dislodge it, was now compelled to retreat. On the appearance of French's and Meagher's brigades at the front, the retreating Union troops rallied and prepared for another attack; but the Confederate advantage was not followed up. During that night the Union army was withdrawn to the right bank of the river. Gen. McClellan's action in this battle has been severely criticised. He left Porter with 27,000 men to bear the entire burden of the fight, and at a critical moment gave him 8,000 more men only. While Porter's force of 35,000 was opposing a Confederate force of nearly 80,000, as above, McClellan remained all day on the s. side of the Chickahominy with the bulk of his army; kept there by the shrewd demonstrations of Gen. Magruder with 25,000 Confederates.

GAINESVILLE: city, cap. of Hall co., Ga.; on the Richmond and Danville and the Georgia railroads; 53 m. n. e. of Atlanta. It is located on the summit of the Chattahoochee ridge, the watershed between the Gulf of Mexico and the Atlantic Ocean. On 1903, June 1, this city and adjacent territory were swept by a tornado which killed 100 persons and destroyed over \$500,000 worth of property. Pop. (1900) 4,382.

GAINSAY, v. *gān'sā* [AS. *gean*; Icel. *gegn*; Ger. *gegen*, against, and *say*]: to speak against; to contradict; to oppose in words. GAIN'SAYING, imp. GAIN'SAID, pp. *-sād*, contradicted. GAIN'SAYER, n. *-sā-ēr*, one who; an opposer.

GAINSBOROUGH, *gānz'būr-rūh*: market-town and seaport of England, county of Lincoln, on the right bank of the Trent, about 20 m. above the embouchure of that river in the Humber mouth, and 16 m. n.w. of Lincoln. It is well built, consisting mainly of one long street parallel with the river, here spanned by a fine stone bridge of three elliptical arches. G. was constituted a port 1841. The most interesting building, is the Old Hall or Manor House, a portion of which has been converted into a Corn Exchange: it is said to have been occupied, or held in property, by the several lords of the manor of G. ever since the Saxons established themselves in this neighborhood. Among the

public buildings are the parish church—rebuilt 1736 with the exception of a fine old tower, dating from the 12th c.—and the town-hall. There is a grammar school established 1589; there are other educational institutions; a literary institute and several libraries. G. is favorably situated for commerce, sea-going vessels, drawing 12 ft. of water, being able to reach its wharfs by the river, while by the Keadby, the Chesterfield, and other canals, it has communication with the interior. It has important manufactures of linseed oil, and carries on malting, rope-making and ship-building extensively. Pop. (1871) township 7,564; (1881) 10,964; (1891) 16,109.

GAINSBOROUGH, *gānz'būr-ūh* or *-b'ro*, THOMAS: 1727–1788, Aug. 2; b. Sudbury, Suffolk, England: eminent landscape-painter. He early showed talent for painting. 'Nature,' it has been said, 'was his teacher, and the woods his academy, where he would pass his mornings alone, making sketches of an old tree, a marsh, brook, a few cattle, a shepherd and his flock, or any other objects that casually came in view.' At 14 years of age he was sent to London, where he was for some time with Gravelot, the engraver, and afterward with Hayman. At 19 he married, and set up in Bath as a portrait-painter, and was very successful; but his genius found its first adequate expression in the delineation of the rich and quiet scenery of his native country, and to this mainly he applied himself after leaving Bath for London, 1774. On the institution of the Royal Acad., G. was chosen one of the first members, but never took much interest in its proceedings. His last words in dying, enthusiastic utterance of the artist rather than a dictum in theology, were, 'We are all going to heaven, and Vandyck is of the party.'—G.'s portraits are remarkable as 'striking likenesses,' but are not carefully finished. The best are those of the Royal Family, of Abel the composer, and Quin the actor. His fame rests chiefly on his landscapes; in these he shows himself a faithful adherent to nature, as he knew it in his own England. He is to be regarded as the first truly original English painter, and, in the opinion of Sir Joshua Reynolds, fit to be the head of an English school. Among his finest productions are, *The Shepherd's Boy*, *The Fight between Little Boys and Dogs*, *The Seashore*, and *The Woodman in the Storm*. His most celebrated picture is *The Blue Boy*, in the Devonshire Gallery.

'GAINST, contr. for AGAINST.

GAINSTRIVE, v. *gān'strīv* [*gain*, and *strive*]: in *OE.*, strive against; to make resistance.

GAIRISH, or GARISH, a. *gār'ish* [*OE. gaure* or *gare*; Swiss, *glare*, to stare]: unduly or tastelessly fine; staring; glaring; showy; extravagantly gay; in *OE.*, flighty. GAIRISHLY, ad. *-lī*, splendidly; gaudily. GAIRISHNESS, n. finery; flaunting gaudiness. *Note.*—*OE. gare*, and Eng. *gaze*, are modified forms of *garish*: comp. Gael. *gair-theas*, the glittering reflection of the sun's rays from water or a polished surface.

GAISIN—GAIUS.

GAISIN, or **GAICYN**, or **GAJSSIN**, *gā'ē-sīn*, or **HAISEIN**: town of s. Russia, govt. of Podolia, 172 m. n. by w. from Odessa, 178 m. e. of Kamenetz Podolski. It has an orthodox church, a synagogue and Jewish chapels, and a hospital. Pop. abt. 10,000, of whom nearly 2,000 are Jews.

GAIST-COAL, n. *gāst'kōl* [*gaist*, a ghost]: a piece of dead coal, that instead of burning appears in the fire as a white lump.

GAIT, n. *gāt* [Dan *gade*, a street: Icel. *gata*, street, path: Sw. *gata*, a street, a way]: manner and air in walking; walk or march; carriage. **GAITED**, a. *gāt'ēd*, having a particular manner of walking.

GAITERS, n. plu. *gā'tērz* [F. *güestre* or *guêtre*]: coverings of cloth for the legs and ankles, coming down over part of the shoe; a kind of shoe.

GAITIN, n. *gāt'in*, or **GAITING**, n. *gāt'ing*: in *Scot.* and *prov. Eng.*, the setting up of quantities of damp grain to dry, afterward to be bound into sheaves; the setting up of single sheaves for drying.

GAIUS, *gā'yūs*: Roman jurist: probably of the age of the Antonines, and the chief source of our knowledge of Roman law prior to Justinian. Considering the important place which he holds in ancient legal literature, it is strange that his personal history should be almost entirely unknown, and that nearly every circumstance connected with him should be a subject of controversy. The discussion as to whether the name is properly *Gaius* or *Caius* is a mere verbal dispute; but the questions regarding his country, his condition, and even his religion, have been canvassed at considerable length. From his being uniformly called by the single appellation G., it has been inferred that he was either a foreigner or a freedman: from his familiarity with the Greek language, some have argued that he was of Greek origin; from his being cited as 'our' G. by Justinian, native of Illyricum, it is argued by some that G. must have been an Illyrian by birth; while others, arguing from the same fact, and equally inconclusive data, have even set him down as a Christian. That the last inference is a mistake is nearly certain. As to the date of G., this is known, that before the revision of the Roman laws, and the reform of the legal studies by Justinian, the *Institutions* of G., as well as four other of his treatises, were the received text-books in the schools of law. His *Institutions*, moreover, formed the groundwork of the *Institutions* of Justinian. From his being thus preferred to Ulpian or Papinian, it is not to be inferred that he lived after them, but only that his work was more popular. The latest jurist whom he cites is Salvius Julianus, who lived under Hadrian, and the latest imperial edict one of Antoninus Pius, whence it may fairly be concluded that he survived Antoninus, and probably wrote under his successor.

The works of G. were largely used in the compilation of the *Digest*, which contains no fewer than 535 extracts from his writings. The principal works are the *Edictum Provin-*

GAIUS.

ciale, 32 books; the *Aurea*, seven; the *Edictum Urbicum*; *On Trusts*; *On Mortgages*; and, above all, the *Institutions*, four books. The last-named work is that by which chiefly G. is known, and it was probably the earliest complete and systematic text-book of Roman law. Although it was the basis of Justinian's *Institutions*, both as to its matter and its division, yet it was completely superseded by that work, and after a time was entirely lost, the only knowledge of it which remained being that which was gathered from the detached extracts in the *Digest*, and from the *Breviarium Alaricianum*, or code of the Visigoths, which was known to be derived from it. The recovery of this long-lost work was remarkable. It had long been known that the mss. in the library of the chapter of Verona were specially curious in the matter of jurisprudence; and Niebuhr, on his way to Rome, 1816, discovered, in a palimpsest ms., whose later writing was a copy of St. Jerome's epistles, portions of the work of some ancient jurisconsult, the value of which he at once recognized; and a specimen page, as copied by him, was soon pronounced by Savigny a portion of the *Institutions* of Gaius. On the publication of his report, the Berlin Acad. of Sciences commissioned two German scholars, Göschen and Hollweg, 1817, to make a copy of the entire palimpsest, which consists of 127 sheets. It was an immense labor. The original writing had been very carefully washed, and in many pages scraped out; the lines of the second writing did not cross the original, as often happens in palimpsests, but ran in the same direction, and frequently over it; while 63 pages of the palimpsest had actually been written three times, G. having been erased to make room for a theological treatise, which in its turn was scraped out to make room for St. Jerome. It is great credit to the skill and patience of the copyists that they succeeded in recovering so much as nine-tenths of the entire work; it was published, 1821, by Göschen, and again, after a fresh collation of the ms. by Blume, 1824; a third, and much improved ed., by Lachmann, appeared 1842. A comparative ed. of the *Institutions* of G. and of Justinian, by Klenze and Böcking, was published, Berlin, 1829.

The *Institutions* of G. are divided into four books, of which the first is devoted to the law of persons, the second and third to the law of things, and the fourth to the law of actions. The first book was translated into German, 1824, by Von Brockdorff, and the entire work has been translated into French three times—by Baulet, 1826, by Domenget, 1843, and by Pellat, 1844. In England it has attracted little notice, except in a few of the critical journals, and there chiefly as a literary curiosity; nor has any English translation of the work hitherto appeared.

The *Lex Romana Visigothorum*, or *Breviarium Alaricianum*, is in substance a recast of the *Institutions* of G., published, 506, by Alaric for the use of the Roman subjects of the west Gothic kingdom. It is curious chiefly as illustrating the analogies and the discrepancies of Roman and barbarian law, and as supplying the germ of many of the mediæval institutions by which Roman practice was

GALA—GALACTIC.

supplanted. See, besides editions of the *Institutions* enumerated above, Huschke, *Zur Kritik und Interpretation von Gaius Institutionen*, in his *Studien des Römischen Rechts*; also Mackeldey's *Lehrbuch des Römischen Rechts*; and Savigny, *System des heutigen Röm. Rechts*.

GALA, n. *gā'lä* or *gá'lä* [It. *gala*, ornament: OF. *gale*, good cheer: Sp. *gala*, a court dress: comp. Gael. *ceòl* = *geòl*, music, melody]: a festival with music; display; splendor. GALA-DAY, a day of pomp, splendor, or festivity.

GALABAT, or GALLABAT, or METEMME: town on the Egyptian-Abyssinian frontier; lat. 13° n., long. 36° e.; 100 m. w. of Gondar. It was permanently settled by a colony of Tokrooris from Darfur, under permission of the king of Abyssinia, as a resting-place for pilgrims returning from Mecca; is purely Abyssinian in the style of its houses, and is the staple market for the exportation of Abyssinian produce across the Egyptian frontier. Till 1873, it was also the centre of the Egyptian slave trade. In 1862. the authority of the viceroy of Egypt was not recognized there, but by 1873 the Egyptians had established a camp, with a strong stone wall, on the top of a hill commanding the town, and acted as masters of the place. Large amounts of beeswax, coffee, hides, and cotton are annually transferred there. Area of town and dist., 40 sq. m; pop. of both, 20,000.

GALACTIC, a. *gā-lāk'tik* [Gr. *gala*, milk, *galaktos* of milk]: connected with or relating to the galaxy or milky-way; of or pert. to milk. GALACTILE, n. *gā-lāk'til*, a mineral, so called from its giving the color of milk when triturated among water. GALACTINE, n. *-tīn*, nitrogenous substance obtained from milk; found also in blood, gastric juice, animal membranes, eggs, the juices of edible plants, and in the fluid of the embryonal cotyledons. GALAC'TOCELE, n. *-tō-sēl* [Gr. *kēlē*, a tumor]: a tumor formed in the breast during lactation. GALACTOMETER, n. *gāl'āk-tōm'ē-tēr*, or LACTOMETER [Gr. *metron*, a measure]: instrument for indicating the specific gravity of milk, and supposed to show whether water has been added or any portion of the cream removed. It consists of a glass tube on which is a graduated scale, and is so constructed that it will float in a liquid and remain upright. It is really a hydrometer, or areometer (q.v.), with a scale arranged especially for milk. While it shows deviations from the normal specific gravity, it does not prove that milk has or has not been diluted. An unusually large proportion of cream sometimes makes the specific gravity of absolutely pure milk too low for the standard gauge of the G. The removal of cream from ordinary milk makes it too heavy, but the addition of water restores it to the proper specific gravity. Dilution with water without the removal of cream is not always indicated by the G. Variations in the temperature of the milk also cause a wide difference in the indications of the G. On account of these imperfections the G. should be used only in connection with a gauge for determining the percentage of cream, and different samples of milk should be tested at a uniform tem-

GALACTODENDRON—GALAGE.

perature. To place the question of dilution or adulteration beyond doubt a chemical analysis is requisite. GALACTOPHOGIST, n. *-tŭf a-jĭst*, one who subsists on milk. GALACTOPHAGOUS, a. *-gus*, feeding or subsisting on milk. GALACTIC CIRCLE, the ground-plane of the sidereal system, as the invariable ecliptic is of the planetary system in astronomy: see GALAXY.

GALACTODEN'DRON: see COW-TREE.

GALACTOPHOROUS, a. *găl'ăk-tŭf'ŏ-rŭs* [Gr. *gala*, milk, *galaktos*, of milk; *phorĕō*, I carry]: conveying milk or white juice; applied to certain ducts or canals in the mamma which convey the milk to the summit of the mam-milla.

GALACTOSE, n. *gă-lăk'tŏs* [Gr. *gala*, milk, *galaktos*, of milk]: a variety of milk-sugar or lactose formed by boiling it with dilute acid.

GALACZ, *gă'lătch*: important town and river-port of Moldavia; centre of the commerce of the whole Rumanian principality; on the left bank of the Dănu-be, about three m. below the confluence of the Sereth, and 92 m. from its mouth. G. occupies a slope stretching gently down to the river, and is divided into an Old and New Town, the former mostly of irregular one-storied houses, the latter built more after the fashion of w. Europe. With the exception of its churches and the residences of the foreign consuls, G. has no remarkable buildings. But its dock-yard, its large bazaar, its numerous grain-stores, its magazines of eastern wares, and its rich banking establishments are notable. It is the principal emporium for the various produce of the Rumanian side of the lower Danube, which is brought down to G. from the interior in bullock-carts, and thence shipped to foreign countries. The only cities on the whole of the great river that have more extensive trade are Vienna and Pesth. The chief exports are wheat, wheat-flour, maize, barley, and rye; also smaller quantities of oats, beans, millet, rape, and linseed. Other articles of produce are soft pine timber and planks, oak staves, tallow, wool, hides, petroleum, spirits, cheese, and salt fish. The increase in the commerce of G. during the last 30 years has been very great. In 1852, the total value of the exports amounted to abt. \$2,750,000, and of the imports to abt. \$2,145,000; 1870-80, the exports from G. had an annual value of abt. \$7,300,000, and the imports of nearly \$9,700,000. It is estimated that Great Britain takes about half of the exports, and supplies about a third of the imports. The chief British imports are cotton goods, iron (bars and sheet), coals, coffee, agricultural machinery; and colonial produce, spices, drugs, tea, sugar, etc. In 1878, the number of ships that entered the port was 4,038, tonnage 552,677; cleared 4,022, tonnage 546,145 (including small river craft). A third of the foreign tonnage was British. G. is connected by railway with Bucharest (*via* Brahilov) and Czernowitz. Pop. (a medley of Moldavians, Greeks, Jews, Armenians, Italians, French, English and Germans) 1900, 62,678.

GALAGE, n. *gă-lăj'* [see GALOCHE, or GOLOSH]: in O.E.,

GALAGO—GALAPAGOS ISLANDS.

a kind of patten or clog fastened with latchets; a coarse shoe; an overshoe.

GALAGO, *ga-lā'gō* (*Galago* or *Otalicus*): genus of mammalia of the Lemur family, remarkable for the great length of the hind legs, and the great size of the ears, which are membranous and capable of being folded down, as in bats. The head is rounded, the muzzle short, the eyes very large; all the feet have five toes; all the nails are flat, except those of the first digits of the hind feet, which are armed with sharp claws; the tail is very long and almost bushy. The species are natives of Africa and Madagascar, varying from the size of a rabbit to that of a rat; more or less nocturnal in their habits; very lively and active; feeding partly on fruits and partly on insects; one of them (*G. Senegalensis*) is known in Senegal as the *gum animal*, from living much in acacias, and feeding, or being supposed to feed, on their gum. 'These pretty animals have all the activity of birds, leaping from bough to bough. They watch insects flitting among the leaves, listen to the fluttering of the moth as it darts through the air, lie in wait for it, and spring with the rapidity of an arrow, seldom missing their prize, which is caught by their hands.' When they leap, they always seize with their hands the branch on which they intend to rest. They make nests of grass and leaves for their young in the branches of trees. They are a favorite article of food in Senegal.

GALAM BUTTER: see **SHEA**.

GALANGAL, n. *gāl'ān-gāl* [native name: Sp. *galanga*, a species of arrowroot], (*Alpinia*): genus of plants of nat. ord. *Zingiberaceæ* or *Scitamineæ*, having perennial stems with terminal inflorescence and succulent fruit. The root-stocks have stimulating properties similar to those of ginger. The true G. is the produce of *A. galanga*, native of the Eastern Archipelago, and cultivated there; having a stem six or seven ft. high, broad leaves, and a branched panicle of greenish-white flowers. The root-stock, when young, yields a kind of arrowroot, and is used for food; it acquires pungency and aromatic properties as it becomes older, and was formerly used in medicine. G. is in use in the East for the same purposes as ginger.

GALAN'THUS: see **SNOW-DROP**.

GALAPAGOS ISLANDS, *gāl-a-pā'gos* or *gā-lā'pā-gōs* [from Sp. *galápagos*, tortoise]: volcanic group in the Pacific, on or near the equator, long. 89°—92° w. They are 13 in number, the largest measuring 60 m. by 15, with an elevation of 4,000 ft. The islands contain probably 2,000 eruptive volcanic cones, though at present volcanic activity is suspended. They can hardly be said to be peopled, with the exception of three, which are used by the govt. of Ecuador as penal settlements. The fauna and flora of the islands are very peculiar, many of the animals and vegetables being found only here. Reptiles are very numerous. The G. I., formerly visited chiefly for their land-tortoises of enormous size and prodigious number, are nearly deserted, as the tortoises are smaller and scarcer. The 10

GALASHIELS—GALATIA.

principal members of the cluster are Albemarle (60 m. long), Indefatigable, Chatham, Charles, James, Narborough, Hood, Barrington, Bindloes, Abingdon.

GALASHIELS, *gāl-a-shēlz'*: town in Scotland, chief seat of the Scotch tweed manufacture, occupying two m. of the narrow valley of the Gala immediately above its junction with the Tweed. Although situated partly in Roxburghshire and partly in Selkirkshire, for judicial purposes it is held (since 1867) as within the county of Selkirk. It is 33½ m. s. of Edinburgh, 4 m. n. of Melrose. In 1630, G. was erected a burgh of barony; by the Reform Act of 1868, it is now a parliamentary burgh. It is governed by a council of 15—of whom one is provost and four are bailies. A local act of parliament was obtained in 1876, under which the bonds of the burgh were extended for municipal purposes, and a water supply introduced. The boundary between Melrose and G. parishes intersects the town, occasioning some confusion in administration. G. had (1883) 20 woolen factories containing 100 'sets' of carding engines, employing 3,400 hands, capable of turning out annually about £750,000 worth of goods. The product is almost exclusively the well-known woolen cloth called Scotch tweed. The mills are almost dependent on steam for motive power. The town has the largest and best appointed skinnery in Scotland. Pop. (1871) within the burgh 9,678; (1881) the extended burgh 12,434, entire town 15,330; (1891) 17,249.

GALATA, *gāl'lá-tá*: suburb of Constantinople (q.v.)

GALATEA, n. *gāl-a-tē'a* [L.]: in *myth.*, a sea nymph, daughter of Nereus and Doris.

GALATEA: see PLANETOIDS.

GALATHEA, n. *gāl-a-thē'a* [from *Galatea*, daughter of Nereus and Doris]: typical genus of *Galatheidæ*, a family of decapod crustaceans, sub-order *Anomoura*, which they connect with the *Macrura*.

GALATIA, *ga-lā'shī-a*: in ancient times, a country of Asia Minor, so called from a body of Gauls who settled there. In B.C. 3d c. great hordes of Gauls, under Brennus, invaded Greece. Some of them took possession of Byzantium and the Propontis, passed the Hellespont on the invitation of Nicomedes, King of Bithynia, B.C. 278, subdued Troas and the n. of Phrygia, and were checked first by Attalus, King of Pergamus, in a great battle about B.C. 229, and compelled by him to settle permanently within certain limits. The state of G., which had had no accurately defined boundaries, was now confined between Paphlagonia, Pontus, Cappadocia, Lycaonia, Phrygia, and Bithynia. It was called also Gallogræcia, and was peopled by numbers of Phrygians, Greeks, and Paphlagonians, as well as Gauls or Celts. The form of government was at first purely aristocratic, but later the 12 tetrachs who shared the government among them, in conjunction with a senate of 300 members, succeeded in making their dignity hereditary. At length (B.C. 30) one of them, supported by Pompey, assumed the title of king. After his death, the king-

GALATIANS—GALATINÁ.

dom descended to Amyntas, but was shortly afterward conquered by the Romans, and converted into a Roman province, divided under Theodosius into *Galatia prima*, cap. Ancyra, and *Galatia secundi*, cap. Pessinus. The majority of the Gauls of G. retained their old Celtic language as late as the time of Jerome (4th c.), who says that they spoke the same dialect as the people about Treves; and as Jerome had himself lived there, and was a good scholar, he may be regarded as an authority on the subject. G. was twice visited by the Apostle Paul.

GALATIANS, n. plu. *gă-lă'shĭ-ănz*: inhabitants of *Galătiă*, in Asia Minor, descendants of the *Gauls*, who settled there: see GALATIA.

GALATIANS, *ga-lă'shĭ-anz*, EPISTLE TO THE: one of the books of the New Testament; a letter written by the Apostle Paul during his residence at Ephesus, probably about A.D. 56; generally reckoned the third or fourth of the Pauline epistles in the order of time. The circumstance which called it forth was the diffusion, throughout the churches in Galatia of Judaistic practices and notions, chiefly the famous rite of circumcision, regarded by Paul as the symbol of all in the Jewish system that was exclusive, external, merely *ethnical*, and therefore set aside by the brighter and universal revelation of God in Jesus Christ. Paul himself had been the first to preach Christ in this region, and as the majority of his converts were Gentiles, it naturally vexed him the more to see them lapsing into practices inconsistent with their new faith, and for which they had not the Jewish excuse that antiquity had made such customs venerable. It appears also that the Judaizing adversaries of Paul had been circulating injurious reports concerning him, hinting that he was no divinely-appointed apostle, but at best a mere messenger of the church of Jerusalem; that he had quarrelled with Peter, the great apostle of the circumcision; and that he could play 'fast and loose' on this very question of circumcision itself. In his reply to his calumniators, Paul asserts the truth of his gospel, declaring that he would pronounce a curse on the very angels from heaven if they would dare to preach another; vindicates his apostleship, and gives the true version of the story of his variance with Peter. He then proceeds to discuss the relation of Judaism to Christianity, and to show the universal provision and offer of God's grace for all nations; closes with a series of exhortations and admonitions, the first of which (v i.) is—'For freedom did Christ set us free; stand fast therefore, and be not entangled again in a yoke of bondage.' The commentaries on Galatians are very numerous; among them are those of Luther, Winer, Rückert, DeWette, Meyer, Ellicott, and Alford.

GALATINA, *gă-lă-tě'nă*, (S. PIETRO IN GALATINA): town in s. Italy, province of Lecce; in a fertile but unhealthy plain, 13 m. s. of the town of Lecce. Some claim for it great antiquity, though for this there seems no historical ground. G. is a thriving commercial town, with fine public edifices and handsome churches. Raimondo

GALATONE—GALAXY.

Orsino, Prince of Taranto and Lord of Galatina, surrounded the town with ramparts, as a tribute to the citizens for having ransomed him from the Turks for 12,000 ducats. Pop. 8,400.

GALATONE, *gá-lá-tō'nā*: very ancient town in s. Italy, province of Lecce, about nine miles n. e. of Gallipoli. is situated in a very rich but insalubrious plain. In the struggle between Joanna, Queen of Naples, and Alfonso, G., having declared for Joanna, was besieged by Alfonso, and its ramparts were destroyed. It has been possessed by several illustrious families. Pop. 5,500.

GA'LA WATER: small river of Scotland, 21 m. in length, rising among the Moorfoot Hills in Edinburghshire, flowing s.s.e. through a beautiful country. In the lower portion of its course it is the boundary between Selkirk and Roxburgh shires. It unites with the Tweed near Abbotsford.

GALAX, n. *gál'áks* [Gr. *galaxaios*, milky, milk white; in allusion to the milk-white spikes of flowers]: genus of *Diapensiaceæ* or of *Pyrolaceæ*. *G. aphylli*, a small plant growing wild in the southern United States.

GALAXIAS, n. *ga-láks'í-as* [Gr. *galaxias*, milky]: typical genus of *Galaxiide*, a family of teleostean fishes, sub-order *Physostomata*; allied to the *Solmonidae*, but destitute of an adipose fin and scales.

GALAXY, n. *gál'áks-í* [Gr. *galaxiās*, the milky-way—from *gala*, milk: F. *galaxie*]: the milky-way; the long white nebulous track which seems to encompass the heavens like a girdle: hence, *fig.*, any assemblage of distinguished persons or things.—*The Galaxy*, the great luminous band which nightly stretches across the heavens from horizon to horizon, is found, when carefully traced, to form a zone, completely encircling the whole sphere almost in a great circle. At one part of its course, it opens into two branches, one faint and interrupted, the other bright and continuous, which do not reunite till after remaining distinct for about 150°. This great zone has occupied the same position in the heavens since the earliest ages. Its course is mapped out on any celestial globe, and an account of it is given in Sir John Herschel's *Outlines of Astronomy*. Its course, as traced by the naked eye following the line of its greatest brightness, conforms nearly to that of a great circle, called the Galactic Circle, inclined at an angle of about 63° to the equinoctial, and cutting that circle in 0 hours 47 minutes, and 12 hours 47 minutes right ascension. Throughout the space where, as above stated, it is divided into two branches, this great circle is intermediate to the two, lying nearer that which is the brighter and more continuous. The most casual survey of the G. shows that it is wanting in regularity of outline. Besides the two great branches into which it divides, it has many smaller ones which spring out from it. At one point, it diffuses itself very broadly, and opens into a fan-like expanse of interlacing branches nearly 20° in breadth. At the same point the branches terminating abruptly, a wide gap presents itself in the zone, on the opposite side of which it recommences its course with a

GALBA—GALBANUM.

similar assemblage of branches. At other points, its course is described by Sir John Herschel as 'irregular, patchy, and winding;' while at more than one point, in the midst of its brightest parts, broad dark spaces occur. One of these, known from early times among navigators as the "coal-sack," is a singular pear-shaped vacancy of about 8° in length, and 5° broad, in the centre of a bright area overlying portions of the constellations of the Cross and Centaur. The 'coal sack' occupies about half the breadth of this bright space, and presents only one star visible to the naked eye, though it contains many telescopic stars. Its blackness, which attracts the most superficial observer, is thus due to the contrast with the brilliant ground by which it is surrounded. The G. was examined by Sir William Herschel with his powerful telescope, and found to be composed entirely of stars. For the mode in which a collection of stars can assume such appearances as are presented in the G., see STARS.

GALBA: see CALOPHYLLUM.

GALBA, *găl'ba*, SERVIUS SULPICIUS, Roman Emperor: B.C. 3, Dec. 24—A.D. 69, Jan. (reigned A.D. 68-69). He was born of a respectable family; was raised to the consulship A.D. 33; and in the administration of the province of Aquitania under Tiberius, of Germany under Caligula, of Africa under Claudius, and of Hispania Tarraconensis under Nero, he distinguished himself for bravery, strictness, and justice. His friends had urged him, on the death of Caligula, to take possession of the throne, but he continued faithful to Claudius, and therefore stood high in his favor. In 68, Julius Vindex rose with the Gallic legions against Nero, and called on G. to assume the imperial dignity, and thus rid the earth of its oppressor. G., who had been informed that Nero was contriving his death, came forward against him at first as the legate of the Roman people, and it was only when he heard of Nero's death that he proceeded to Rome to take possession of the throne offered him by the Prætorians. G. was now more than 70 years old, and it soon appeared that his character had deteriorated, as, indeed, had already been manifested in his later administrations. Indulgence to greedy favorites, ill-timed severity, above all, avarice which led him to withhold the usual donatives to the troops, made him unpopular. The legions in Upper Germany called on the Prætorians to choose another emperor; G. thought to soothe them by adopting Piso as his coadjutor and successor; but he thus offended Otho, who, as administrator of Lusitania, had supported G.; and looked to be rewarded. The Prætorians, who had received no donative on occasion of Piso's adoption, were easily excited to insurrection by Otho, and the emperor having gone out to quell the rebellion, was cut down by the soldiers as he crossed the forum.

GALBANUM, *n. gäl'bă-nŭm* [L.]: a gum resin used in medicine in the same cases as assafœtida, but principally in chronic catarrh, and (especially by the Germans) in amenorrhœa and chronic rheumatism. It is administered

GALBULUS—GALE.

usually in the form of the *compound galbanum pill*, which contains galbanum, sagapenum, assafœtida, myrrh, and soft soap. It is sometimes applied externally in plasters as a mild stimulant in indolent swellings. It is brought from the Levant, and appears in commerce either in tears or in large masses. It is soft, ductile, whitish, or, when long kept, yellowish in color, has a peculiar balsamic odor, and an acrid, bitter taste. Although it has been known from the earliest ages, and is mentioned by Moses (Exod. xxx. 34) under the name *chelbenah* (translated galbanum in the English Bible), it is still uncertain from what plant it is derived. *Galbanum officinale*, *Ferula galbanifera* (found in n. Persia), and *Opoidia galbanifera*, all of nat. ord. *Umbelliferae*, have, on various grounds, been supposed its source. It is highly probable that G. is the product of an umbelliferous plant. *Bubon Galbanum*, a plant of this order, found at the Cape of Good Hope, yields a gum resin very similar.

GALBULUS, n. *gāl'bū-lūs* [L. *galbŭlŭs*; Sp. *galbulo*, the nut of the cypress-tree] in *bot.*, a modification of the cone, where the apex of each carpellary scale is much enlarged or fleshy, so that collectively they form a round compact fruit.

GALE, n. *gāl* [Norw. *galen*, angry: prov. Dan. *galm*, a strong blast of wind: Dan. *gal*, mad: comp. Gael. *gàill*, a storm, and Icel. *gola*, a breeze]: a loud, strong wind; a blast.—**SYN.** of 'gale': wind; blast; gust; breeze; storm; hurricane; tempest.

GALE, v. *gāl* [Icel. *gala*, to sing, to crow: L. *gallus*, a cock]: in *OE.*, to cry; to croak: to scream. **GAL'ING**, imp. **GALED**, pp. *gāld*.

GALE, n. *gāl* or *gāl'lē*, or **SWEET GALE** [Dut. *gagel*], (*Myrica gale*): small shrub of the same genus with the n.



Gale (*Myrica gale*):

a, a scale of the catkin, inside; *b*, stamens; *c*, an anther

American Candleberry (q.v.), and very nearly allied to it—native of all the northern parts of the world, growing in bogs and in moist gravelly soils. It is, in some places, known as Scotch Myrtle, or Bog Myrtle. It has small lanceolate slightly serrated leaves sprinkled with resinous dots, and emitting an agreeable fragrance. Its berries are small, sprinkled with golden resinous dots. The northern nations formerly used this plant instead of hops. The leaves were used as a remedy for itch, and they have the power of keeping away moths. A decoction of them is efficacious against bugs. By distillation they yield a yellow essential oil. In the Highlands of Scotland, beds are often made of the twigs of *G.*, there called *nodh*.

GALEATE, a. *gāl'i-āt*, or GA'LEATED [L. *gālēātūs*, wearing a helmet]: in *bot.*, shaped in a hollow vaulted manner like a helmet; bearing a flower resembling a helmet.

GALEMYS, n. *ga-lē'mīs* [Gr. *galē*, a weasel; *mys*, mouse]: genus of mammals allied to the shrews, or shrew mice.

GALEN, n. *gāl'lēn* [L. *Galēnus*]: the most celebrated Greek physician of antiquity (see GALENUS, CLAUDIUS). GA'LENISM, n. *-izm*, medical theories, teaching, and practice of Galen. GALEN'ICAL, a. *-i-kāl*, of or pertaining to Galen or his doctrines. GA'LENIST, n. *-ist*, follower of Galen: see below.

GALEN, *gāl'lēn*, CHRISTOPH BERNHARD VON, Bishop of Münster, and one of the great generals of his time: 1600, Oct. 15—1678, Sep. 19; b. Bispink, Westphalia. After completing his studies in the Jesuit college of Münster, and at the universities of Cologne, Mayence, Louvain, and Bordeaux, he held several political offices, and was made Bp. of Münster, 1650, Nov. 14. The vigor of his administration immediately began to appear in restoring church-discipline, in allaying a famine which prevailed at the time, in promoting trade, and ridding the country of foreign troops. He soon, however, fell into disagreements with the inhabitants of Münster, who, applying to Holland, received 25,000 guilders to assist them against him; but with the support of 1,200 cavalry from the emperor, the bishop reduced the town into submission 1660, and kept his ascendancy by severe measures. In 1664, on being appointed, with the Markgraf of Baden, director of the military affairs of the Rhenish alliance, he proceeded with most of his own troops to the seat of the war against the Turks. After his return, he entered into alliance with England against the Netherlands, but the war was soon concluded, in consequence of the treaty brought about by Louis XIV. 1666, according to which the States-general promised the restoration to the bishop of all his lands. A dispute, however, afterward arose, and 1672, *G.* again went to war with the Dutch in alliance with France. After some successes obtained in union with Turenne, he suffered such a heavy loss during the siege of Coevorden, by a storm which placed his camp under water, that he willingly concluded a treaty with the allies

GALENA.

1674, in which he promised to give up all his conquests in the Netherlands. In the following year, he changed sides, and entered into alliance with the emperor against the French. By taking part, also, with the king of Denmark and the elector of Brandenburg in the war with Sweden, he added the duchy of Bremen and other places to his possessions. In 1678, he obtained considerable pecuniary compensation for being drawn into war with East Friesland; but while the peace negotiations were going on he died. The family of G. is one of the oldest in Westphalia, and is at present represented by Count Matthias von G., whose brother, Count Ferdinand, distinguished himself in the Prussian service as an able diplomatist.

GALENA, n. *gă-lē'nă*, or LEAD-GLANCE [L. *galēnă*, galena—from Gr. *galēnē*, tranquillity, galena: F. *galène*, a sort of black-lead]: common ore of lead; native sulphide of lead; essentially a sulphuret of lead, the proportions being 13.3 sulphur and 86.7 lead; but usually containing a little silver, and sometimes copper, zinc, antimony, or selenium. It is of bluish-gray color with metallic lustre, is found massive, or sometimes granular, or crystallized in cubes or octahedrons. It is very easily broken, and its fragments are cubical. It occurs in veins, beds, and imbedded masses, often accompanying other metallic ores, in primitive and secondary rocks, but most of all in what is known as transition or mountain limestone. Almost all the lead of commerce is obtained from it. It sometimes contains so much silver, that the separation of that metal is profitably carried on. The lead is extracted from it by a very simple process (see LEAD). GALENIC, a. *gă-lēn'ik*, pert. to galena, or (in med.) to Galen. GALENIZING, a process of depositing upon objects a protective coating of sulphide of lead. It is the invention of Prof. Emerson Reynolds. In general terms an alkaline solution of lead is mixed with a sulpho-organic compound and heated, precipitating sulphide of lead. But instead of the ordinary amorphous form the salt is thrown down upon bodies immersed, as a hard adherent coating that is susceptible of a fine polish. A solution of oxide of lead in sodium or potassium hydrates may be made from the acetate of lead and alkali of such strength that two litres contain the equivalent of 17 grains of acetate of lead. There should be just enough alkali present to nearly dissolve the lead-oxide. The solution is heated to 90°, is filtered and allowed to cool. A solution of 4 grains of sulpho-urea in 100 cubic centimetres of water is now added. If this mixture is heated a deposit of sulphide of lead is formed upon objects immersed, provided their surfaces are perfectly clean. Other methods equivalent in general to the above may be followed.

GALENA, *ga-lē'na*: city in Ill., cap. of Jo Daviess co. in the extreme n.w. corner of the state; on both sides a small river 6 m. above its junction with the Mississippi. It is on the n. division of the Ill. Central railroad, at the terminus of the G. and Southwestern railroad, 450 m. n. of St. Louis, 250 m. n.n.w. of Springfield. Steamboats from

the Mississippi come up to the city. The city, owing to the irregularity of the ground on which it is built, has a bold and picturesque appearance. In and around the town on every side, are high bluffs rising frequently more than 200 ft. The streets rise in terraces, one above another, communicating by flights of steps; and among the public buildings are numerous churches and schools, a U. S. marine hospital and a custom-house. G. is the centre of a rich lead-mining district. Copper also is found, though not in great quantity. G. has manufactures of pottery, soap, and candles; it has also lead furnaces, an iron foundry, and machine-shops; breweries, carriage manufactories, furniture manufactories, and numerous mills. Besides lead, it exports horses, cattle, pork, and agricultural produce. The first house was built here 1819. Pop. (1900) 5,005.

GALENICAL, *ga-len'ik-al*—GALENIST, *gā'lën-ist*: two words referring to the controversies of the period of the revival of letters, when the authority of Galen was strongly asserted against all innovations, and particularly against the introduction of chemical, or rather *alchemical* ideas and methods of treatment into medicine. The Galenists adhered to the ancient formulas, in which drugs were prescribed, either in substance or in the form of tinctures and extracts, etc.; while the chemists professed to extract from them the essences, or quintessences (*quinta essentia*, the *fifth* essence, supposed to be particularly pure, as requiring five processes to extract it), i.e., substances in small bulk, presumed to contain the whole virtues of the original drugs in a state of extreme concentration, or purified from all gross and pernicious, or superfluous matter. On both sides of this controversy there was much blind error and rash dogmatism, which on the side of the chemists, as in Paracelsus, took the form of quackery and mysticism; while the Galenists, on the other hand, were supporters of tradition and all its encumbrances, and often the envenomed partisans of old misconceptions. But the original idea of those who afterward became identified with the sect of the Galenists, was rather to free the ancient medicine from the irrational dogmas and methods with which it had been overlaid by the Arabians and the monks, than to insist blind assent to mere antiquity, or to Galen's authority in particular. Now that chemistry has really given us new methods of preparing drugs, which supersede many used from time immemorial, it is still customary with some to call preparations by the old methods *Galenical*, as contrasted with the crystalline alkaloids, or the perfectly pure acids and bases, which contain the virtues of the most valuable vegetable medicines. See GALENUS, CLAUDIUS: PARACELSUS: **ALCHEMY**: and titles of articles of the *materia medica*.

GALENUS.

GALENUS, *ga-lē'nūs*, CLAUDIUS, commonly called GALEN, *gā'lēn*: 130—abt. 201; b. Pergamus in Mysia: very celebrated physician. In his 17th year, his father, Nicon, who had destined him to be a philosopher, in consequence of a dream chose for him the profession of medicine, which he studied at Pergamus, Smyrna, Corinth, and Alexandria. He returned to his native city in his 29th year, and was at once appointed physician to the school of gladiators. In his 34th year he went to Rome, where he stayed about four years, and gained such reputation that he was offered, but declined, the post of physician to the emperor. He returned to his native country in his 38th year, and had scarcely resumed his ordinary course of life, when he received a summons from emperors M. Aurelius and L. Verus to attend them in the n. e. frontier of Italy, whither they had gone to make preparations for a war with the northern tribes. He joined the camp toward the end of 169; but a pestilence breaking out, the emperors and their court set off for Rome, whither G. accompanied or followed them. On the return of M. Aurelius to the seat of war, G. obtained permission to be left at Rome, alleging that such was the will of Æsculapius, as revealed to him in a dream. How long G. stayed at Rome on this second occasion is not known, but we ascertain from his works that he attended M. Aurelius and his two sons, Commodus and Sextus, and that at about the end of the 2d c. he was employed to compound a celebrated medicine called Theriaca for Emperor Severus. If the statement of one of his Arabic biographers be correct, who expressly says that G. was only twice at Rome, we must infer that the greater part of his middle and more advanced life was spent in that city. The place and date of his death are not known with certainty, but it is believed that he died in Sicily about 201.

The works extant under the name of G. consist, according to Choulant, in his *Handbuch der Bücherkunde für die aeltere Medicin*, of 83 treatises acknowledged genuine; 19 whose genuineness has been questioned; 45 undoubtedly spurious; 19 fragments; and 15 commentaries on different works of Hippocrates. Besides these, he wrote a great number of works whose titles only are preserved, and altogether it is believed that the number of his distinct treatises cannot have been less than 500.

We may divide his works into (1) those on anatomy and physiology; (2) those on dietetics and hygiene; (3) those on pathology; (4) those on diagnosis and semeiology; (5) those on pharmacy and materia medica; (6) those on therapeutics, including surgery; (7) his commentaries on Hippocrates; and (8) his philosophical and miscellaneous works. We have most of these works in Greek, in which they were originally written; some are preserved only in Latin translations, and a few only in Arabic. His most important anatomical and physiological works are—*De Anatomicis Administrationibus*, and *De Usu Partium Corporis Humani*. Of the latter, Dr. Greenhill (Smith's *Dictionary of Greek and Roman Biography*) remarks that 'it is no less admirable for the deep religious feeling with which

it is written, than for the scientific knowledge and acuteness displayed in it.' For a good general account of G.'s anatomical and physiological knowledge, we may refer to a memoir published by the late Prof. Kidd of Oxford in vol. VI. of *The Transactions of the Provincial Medical and Surgical Association*, entitled 'A Cursory Analysis of the Works of Galen, so far as they relate to Anatomy and Physiology': Daremberg's *Exposition des Connaissances de Galien sur l'Anatomie, la Physiologie, et la Pathologie du Système Nerveux* (Paris 1841) also may be consulted with advantage. His anatomical and physiological writings are by far the most valuable. They show his familiarity with practical anatomy; but whether from dissections of human bodies or of those of the lower animals, is uncertain. The latter is probable—(1) because he frequently recommends the dissection of apes, bears, goats, etc.; and (2) because he mentions, as something extraordinary, that those physicians who attended Emperor M. Aurelius in his wars against the Germans had an opportunity of dissecting the bodies of the barbarians. Much curious information regarding G.'s views on dietetics and hygiene will be found in Adam's *Commentary on the First Book of Paulus Aegineta*. His pathology was very speculative and imperfect. In his diagnosis and prognosis, he laid great stress on the pulse, on which subject he may be considered as the first and greatest authority, for all subsequent writers adopted his system without alteration. He likewise placed great confidence in the doctrine of critical days, which he believed to be influenced by the moon. In materia medica, his authority was not so high as that of Dioscorides. Numerous ingredients, many of which were probably inert, enter into most of his prescriptions. He seems to place a more implicit faith in amulets than in medicine, and he is supposed by Cullen to be the author of the anodyne necklace, long famous in England. His system of therapeutics is based on two fundamental principles—(1) that disease is something contrary to nature, and is to be overcome by that which is contrary to the disease itself; and (2) that nature is to be preserved by that which has relation to nature. Hence arise two general indications of treatment—the one taken from the affection contrary to nature, which affection requires to be overcome; the other from the strength and natural constitution of the body, which requires to be preserved.

Before G.'s time, the medical profession was divided into several sects always disputing with one another; e.g., the Dogmatici, Empirici, Eclectic, Pneumatici, and Episyndetici. After G., all these sects seem to have merged in his followers. The subsequent Greek and Roman medical writers were mere compilers from his writings; and as soon as his works were translated (9th c.) into Arabic, they were at once adopted throughout the East, to the exclusion of all others. In short, G. reigned paramount throughout the civilized world till within the last 300 years. The records of the London College of Physicians afford a striking illustration of this fact as concerns England: in

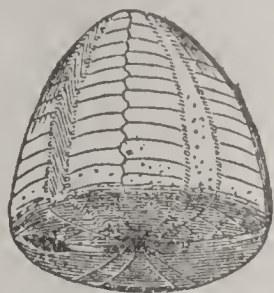
1550, Dr. Geynes 'was cited before the college for impugning the infallibility of Galen. On his acknowledgment of his error and humble recantation, signed with his own hand, he was received into the college.'

The Græek text has been published four times. The first ed. was the Aldine, 1525, in 5 folio vols.; the latest and most accessible ed. is that of C. G. Kühn, in 20 octavo vols. (1821-33). A good critical edition is still lacking.

GALEODES, n. *gāl ē-ō'dēz* [Gr. *galē*, a weasel; *eidos*, form]: typical genus of *Galeodidae*, a family of arachinda (spiders), order *Adelarthrosomata*.

GALEOPITHICUS: see FLYING LEMUR.

GALERITES, n. plu. *gāl'ēr-ītz* [L. *gālĕă*, a helmet]: genus of fossil sea-urchins, peculiar to and abundant in the Chalk measures. The generic name, as well as that popularly given to them in the districts where they abound, viz., 'Sugar-loaves,' is descriptive of the elongated and more or less conical shape (helmet shape) of their shell. The body in breadth is nearly circular or polygonal. The under surface is entirely flat, and has the mouth placed in the centre, with the vent near the margin. There are five avenues of pores reaching from the



Galerites Albogalerus.

mouth to the summit. These fossils are often found silicified. The species figured is one of the most abundant; it has received its specific name from its resemblance to the white caps worn by the priests of Jupiter.

GALERIUS, *ga-lĕ'rĭ-ŭs*. VALERIUS MAXIMIANUS. Roman Emperor: d. 311 (reigned 305-306); b. of humble parentage, near Sardica, in Dacia. Entering the imperial army, he rose from one grade of military rank to another, until Emperor Diocletian conferred on him, with Constantius Chlorus, the title of Cæsar (292), and gave him his daughter in marriage. On the abdication of Diocletian (305), he and Constantius became *Augusti*, or joint rulers of the Roman empire. On the death of Constantius at York (306), the troops in Britain and Gaul immediately declared their allegiance to his son, Constantine (afterward Constantine the Great), much to the chagrin of G., who expected the entire sovereignty of Rome to fall into his hands. G. was a brave soldier and a skilful commander, but appears to have no other claims to the respect of posterity. He hated the Christians 'with a perfect hatred;' and it is believed that it was he who forced Diocletian to issue his famous edict against them, which caused the *last* of the imperial persecutions. His mother, an ignorant pagan fanatic, is said to have exercised much influence over him; but it is highly probable that his treatment of the adherents to the Christian faith was determined also by a politic opposition to Constantius and his son who tolerated, and even respected the new opinions and practices.

GALERUCA, n. *gāl-ēr-ō'ka* [L. *galerum*, a kind of

GALES-GALIANI.

conical head covering]: typical genus of *Galerucidæ*, family of herbivorous, tetramerous beetles, sub-tribe *Cyclica*.

GALES, *gälz*, JOSEPH: 1760-1841, Aug. 24; b. England: journalist. He was a printer, bookseller, and publisher in Sheffield: removed to the United States 1793, settled in Philadelphia, and became editor of the *Independent Gazetteer*. While so employed he was the first to make short-hand reports of congressional debates. In 1779 he sold his paper and removed to Raleigh, N. C., where he founded, and till within a few years of his death edited the *Register*. He was an active supporter of the American Colonization Society.

GALES, JOSEPH: son of Joseph G.: 1786, Apr. 10-1860 July 21; b. Eckington, England: journalist. He was educated at the Univ. of N. C., learned the printer's trade in Philadelphia; became asst. editor of the *National Intelligencer* (the old *Independent Gazetteer*, removed to Washington, and name changed 1800) in 1807, and sole proprietor 1810. In 1812 he associated his brother-in-law, William W. Seaton, with him, and started a daily edition of the *Intelligencer* (1813, Jan.), which was continued till after the death of both partners 1869. The property of the paper with a valuable editorial library was destroyed by the British during the war 1812-15.

GALESBURG, *gälz'berg*: city, cap. of Knox co. Ill.; at the junction of four divisions of the Chicago Burlington and Quincy railroad; 40 m. e. of Burlington, 53 m. w.n.w. of Peoria, 99 m. n.e. of Quincy, 160 m. w.s.w. of Chicago. It contains extensive railroad works, 2 iron foundries, several machine shops, and agricultural implements, carriage, and wagon manufactories; 3 national banks (cap. \$370,000), 1 state bank (cap. \$100,000); 16 churches; high and graded schools, business college, free public library with over 10,000 vols. and 1 daily and 3 weekly newspapers. Knox College (Congl.), founded here in 1837; organized as a coll. 1841; had (1902) 26 instructors, 688 students; president, Thomas McClelland, D.D. Lombard Univ. (Universalist), founded 1857, also is an institution of good rank. Both these colleges afford co-education of the sexes. Pop. (1890) 15,212; (1900) 18,607.

GALE'S COMPOUND: mixture of gunpowder with powdered glass, by which the gunpowder is rendered non-explosive: named from the inventor.

GALESVILLE: village, Trempealeau co., Wis.; on Chicago and Northwestern railroad; 20 m. n. of La Crosse; named for George Gale, who here endowed a university under Methodist auspices. G. has manufactories of flour, butter, and bee-keeping supplies. Pop. (1890) 537; (1900) 862.

GALEUS, n. *gäl'ě-ūs* [L. *galeos*, a kind of shark or dog-fish]: typical genus of the family *Galeidæ*, a family of squalina (sharks).

GALIANI, *gá-lě-á'ně*, FERDINANDO: 1728-87; b. in Chieti, a province of the Abruzzi: Italian savant. He showed an

GALICIA.

early and extraordinary aptitude for learning. Philosophy, history, archeology, and especially political economy, were his favorite studies; but he attracted notice first by a clever squib on the death of the public executioner. This consisted of a collection of essays eulogistic of the deceased, in which the style of the president and leading members of the Neapolitan Acad. was admirably imitated. His next publication, *Della Moneta*, written when he was scarcely 20 years old, evinced great learning and powers of reflection, and a valuable contribution to the science of political economy. Its leading principle is, that coin is a merchandise, and that its value and interest ought to be left free like other goods. In 1751, he visited the chief cities of Italy, and was everywhere honorably received. On his return to Naples he collected a rich assortment of the stones and volcanic matter of Vesuvius, which he presented to the pope, accompanied by a learned thesis. On one of the stone specimens, he engraved the following suggestive inscription, *Beatissime pater, fac ut lapides isti panes fiant*; and received as answer the rich prebend of Amalfi, for which he had previously qualified himself by entering into holy orders. In 1759, he became sec. to the Neapolitan embassy at Paris, where his wit, vivacity, and learning made him a universal favorite. In 1767, he visited England, whose social and political institutions he studied deeply. On his return to Paris, he wrote another treatise on political economy, entitled *Dialoghi sul Commercio del Grano* (Dialogues upon the Trade in Corn), in which he argues against both the extreme protectionists, and the pure free-traders. Recalled to Naples, he was successively appointed to various posts of trust and importance. He died at Naples, leaving rare collections of musical mss., ancient coins, sculptures, medals, precious stones, cameos, etc.

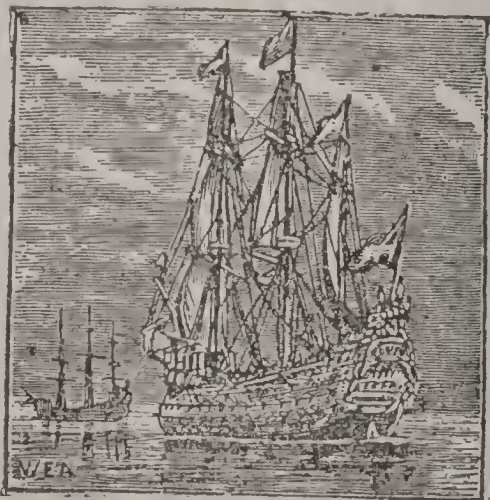
GALICIA, *ga-lîsh'î-â*, Sp. *gâ-lē'thē-â*: crown-land belonging to the Austrian monarchy, including the former kingdoms of Galicia and Lodomeria, the duchies of Auschwitz and Zator, and grand duchy of Cracow; 30,307 sq. m. pop. (1900) 7,315,816. With the exception of 114,000 Germans, and nearly 500,000 Jews, the inhabitants are of the Slavonic race, western G. being occupied mainly by Poles, the east by Ruthenians. In faith the people of G. are mostly Rom. Catholics. The country is a high terrace, at the n. base of the Carpathians. The n. portion is an extensive plain, broken only by low ranges of hills. There are many large rivers—those in the w. being feeders of the Vistula, those in the e. of the Danube and Dneister. The climate of G. is colder than that of any other portion of the Austrian empire; the soil, with the exception of some sandy and marshy districts, is fertile, and produces grain, exported in considerable quantities. Flax, hemp, tobacco, hops, etc., are cultivated. Horses, cattle, and sheep are raised. Wolves and bears are still found in the mountainous districts. Salt is the most important mineral. Industry has lately made marked progress. Commerce is on the increase. The roads are good; the railway from



Dutch Galiot.



Galleass.



Spanish Galleon.

GALICIA—GALILEE.

Cracow to Lemberg has greatly developed the resources of the country. For administrative purposes, G. has been divided into Lemberg, Cracow, and Stanislawow. G. takes its name from the old fortress and town of Halicz (q.v.) on the Dneister. The original Slavonic inhabitants, the Ruthenes, were, in the 9th c., conquered by the Russians of Kiew. The w. portion of the country had already become dependent on Poland, and afterward on Hungary. In 1382 it was restored to Poland, and so continued till the partition of Poland 1772, when G. became one of the crown-lands of Austria. In 1846, Cracow, with the territory belonging to it, was, by a treaty of the three powers (Austria, Russia, and Prussia), given up to the emperor of Austria, and by him annexed to the crown-land of Galicia.

GALICIA: formerly a province in the n.w. of Spain, 11,344 sq. m.; divided, since 1833, into the minor provinces of Coruña, Lugo, Orense, and Pontevedra. The country is mountainous, being covered by several offsets of the Asturian chain, rising in their highest peaks about 6,000 ft. Capes Ortegal and Finisterre project into the Atlantic. The numerous rivers form *Rias*, or small estuaries at their mouths affording secure havens and roads. The principal river is the Minho, which, with its feeders, the Sil and the Avia, is navigable as it approaches the sea. G. is one of the most fruitful portions of Europe, and has a mild nourishing climate. Rich meadows and dense forests are numerous, but the soil is suited to the cultivation rather of garden produce than of corn. The inhabitants, called Gallegos, are a robust vigorous and industrious race. They visit various parts of the country, and are employed in Madrid as water-carriers, porters, etc. Fishing and navigation are the occupations most largely followed. Linen manufactures have been recently established. The principal towns are St. Jago di Compostella, and the two strongly fortified seaports of Coruña and Ferrol. Pop. of the four provinces (1900) 1,980,515.

GALICZ: see **HALICZ: GALICIA** (Austria).

GALIGNANI, *gâ-lên-yâ'nê*. **JOHN ANTHONY:** and **WILLIAM:** Parisian publishers: John Anthony, 1796, Oct. 13—1873, Dec.; William 1798, Mar. 10—1882, Dec.; both in London. Their father, an Italian, founded an English library at Paris 1800, and there published an *English Library Reportory*, and began 1814 the famous newspaper, *Messenger*. The *Messenger* was much improved by him who made it an important medium for advocating cordiality between England and France. The brothers, distinguished by works of philanthropy, received honors from both governments, and had wide popularity and respect.

GALILEE, n. *gâl-î-lî*: a province of Palestine (see below); a porch or chapel at the entrance to some churches, beyond which women were not permitted to pass. In abbeys the monks came to the galilees to see their female relatives. Sometimes a portion of the nave was marked off by a step, or as at Durham, England, by a line of blue marble, as the boundary for women. There are fine

GALILEE.

specimens of galilees at Lincoln and Ely. GAL'ILE'AN, n. -lē'ān, an inhabitant of Galilee.

GALILEE, *gāl ʾi-lē* [Heb. *Galil*, a 'circle' or 'circuit']: name applied latterly to one of the four Roman divisions of Palestine; originally referred only to a district of the tribe of Naphtali. Here were the 20 towns which Solomon gave to Hiram, King of Tyre, for his assistance in building the temple. Phœnician colonies, in consequence, appear to have established themselves here, for at a latter period we find Isaiah (ix. 1) speaking of the district as 'Galilee of the nations.' These 'nations,' or Gentiles (heathen) finally spread themselves over the surrounding country, until, in the time of our Lord, the name 'Galilee' embraced all northern Palestine from the Mediterranean to the Jordan. The district was divided into Upper and Lower G., the former hilly but well wooded, the latter level and very fertile. As early as the time of the Maccabees (I. Macc. v. 20-23), the number of Jews in G. was very small; Strabo, contemporary of Christ, states that in his day it was inhabited mainly by Syrians, Phœnicians, and Arabs, to whom Josephus adds Greeks. The principal towns at the dawn of Christianity were Tiberias, Tarichæa, and Sepphoris; those that figure in the gospels are Cana, Capernaum, Nazareth, and Nain. The Jewish inhabitants of G. spoke a broader and coarser dialect than their southern brethren of Judæa, and were held in low estimation by the latter, partly on account of their less strict sentiments in regard to religion, which were due probably to their intercourse with heathen neighbors. Every one of the disciples was a Galilean either by birth or residence, and consequently may not have been a *Jew* at all in the strict sense of the term; i. e., in being able to boast of having 'Abraham for his father.' The first three gospels chiefly contain records of the Savior's ministrations in this province. After the destruction of Jerusalem, the despised G., as if retributively, became the refuge of the proud doctors of Jewish law, and the city of Tiberias the seat of rabbinical learning. The ruins of many fine synagogues are extant in the old towns and villages of this region. At present, G. belongs to the pashalic of Damascus, in the Turkish province of Syria or Soristan, and, as of yore, is remarkable for beauty and fertility. It still has a considerable number of Jewish inhabitants. For Sea of G., see GENNESARET.

GALILEI.

GALILEI, *gá-le-lá'ē*, GALILEO: bringer of the new era in experimental science: 1564, Feb. 15—1642, Jan. 8; b. Pisa; of a Florentine family more ancient than opulent. By desire of his father, G. directed his early studies exclusively to medicine, and to the prevailing Aristotelian philosophy, whose dogmas he soon ventured to disbelieve and despise. At the age of 18, he made one of his most important discoveries. Happening to observe in the Cathedral of Pisa the oscillation of a lamp casually set in motion, G. was struck with the apparent measured regularity of its vibrations; and having tested the correctness of this observation by comparing the beat of his own pulse with the action of the pendulum, he concluded that by means of this equality of oscillation a simple pendulum (q v.) might be made valuable for the exact measurement of time. This discovery he successfully applied in constructing a clock for astronomical purposes. G.'s irrepressible bias toward mechanical constructions and experimental science received new impulse from intercourse with his father's friend Ostilio Riccio, prof. of mathematics, who, in compliance with the youth's entreaties, initiated him into the principles of mathematics. Such was G.'s absorption and delight in his new studies that his father at length sanctioned his abandonment of the art of medicine, for his chosen sciences. The first fruit of his geometrical investigations was the invention of a hydrostatic balance, by which the specific gravity of solid bodies might be ascertained with accuracy. In 1589, the fame of G.'s extraordinary learning having reached the Grand Duke of Tuscany, this enlightened prince appointed him prof. of mathematics in the Univ. of Pisa, where he covertly inculcated many of those great innovations in physical science which have since given lustre to his name. About this period, he turned his attention to the very imperfectly known laws of bodies in motion; and in opposition to all received systems, he propounded the novel theorem that all falling bodies, great or small, descend with equal velocity. This soon led him to the discovery of 'the *three* laws of motion,' and the law regulating the motion of falling bodies, which is expressed by the formula $S = \frac{1}{2} ft^2$. This theory of falling bodies was proved correct by several experiments from the summit of the leaning tower of Pisa, greatly to the chagrin of the Aristotelians, whose enmity to G. now grew more decided. In consequence, he deemed it prudent to relinquish his chair at Pisa, and retired to Padua, where he accepted the offer of the Venetian senate to lecture on mathematics in the univ. for six years. It is also said, however, that G. lost his chair at Pisa from having ridiculed the mechanical pretensions of John de' Medici, son of Cosmo I. G.'s engagement at Padua was eventually prolonged to 18 years; but so urgent was his desire to return to his birthplace that he sought a restoration to his former post at Pisa, and was gratified by an assent eagerly accorded by Cosmo de' Medici, with exemption from any but a voluntary exercise of the duties of the professorship. During his sojourn at Padua, his course of lectures had extraordinary popularity;

crowds of pupils flocked to hear him from all parts of Europe; and he was the first to adapt the Italian idiom to philosophical instruction. Among the various and noble discoveries with which he enriched science, were a species of thermometer, a proportional compass or sector, and, most important of all, the construction of the refracting telescope for astronomical investigation. In 1609, he offered his first complete telescope to the Doge of Venice, Leonardi Deodati, by whom it was tested from the tower of St. Mark with equal surprise and delight. In the same year, he constructed a microscope; and then this indefatigable interpreter of the mysteries of nature commenced his astronomical researches by means of his own telescope. He speedily concluded that the moon, instead of being a self-luminous and perfectly smooth sphere, owed her illumination to reflection, and presented an unequal surface, deeply furrowed by valleys and mountains of great extent. The Milky Way he pronounced a track of countless separate stars; and these discoveries were crowned by a still more important series of observations, which led to the discovery of the four satellites of Jupiter on the night of 1610, Jan. 7 (though it was not till Jan. 13 that he came to the conclusion that they were satellites, and not fixed stars), which he named the Medicean stars, in honor of his constant protectors in that family. He also was the first to note movable spots on the disk of the sun, from which he inferred the rotation of that orb. Encircled by the lustre of these sublime discoveries, he departed from Padua, and returned to Tuscany 1610, where renewed quarrels with the Aristotelians disquieted and embittered his existence. In 1611 he visited Rome, and was received with great distinction, being enrolled a member of the Lincei Academy; but four years later, on repeating the visit, his reception was widely different, as by that time in his work on the solar spots he had openly advocated the Copernican system, and was in consequence denounced as a propounder of heretical views. He repaired again to Rome, to demand an experimental inquiry into the soundness of his views; but the grand duke apprehending inquisitorial dangers for his favorite, summoned him back to Tuscany; at the same time the pope, through the famous Cardinal Bellarmine (a sincere friend of G.), commanded him to abstain from all future advocacy of his heretical doctrines. Some time afterward he wrote his most famous work in the form of a dialogue between three fictitious interlocutors, one in favor of the Copernican system, the second an advocate of the Ptolemaic, and the third a rabid supporter of the Aristotelian school. Of course, the whole weight of the *proof* falls into the Copernican scale; and this composition has a wonderful classic beauty and a compact chain of argument. In 1630, G. contrived to obtain the papal imprimatur, which was subsequently revoked; but having got a similar authorization at Florence, he published, 1632, this exponent of his opinions under the title of *Un Dialogo intorno i due Massimi Sistemi del Mondo*. Hardly had the work been issued, when it was given over to the jurisdiction of the In-

quisition. Pope Urban, previously Cardinal Barberini, until now a friend and eulogist of G., was led to believe that G. had satirized him in this work under the title of *Simplicio*, as one who is careless about scientific truth, and who timidly adheres to the saws of antiquity. He resolved to punish the audacious philosopher. In spite of his 70 years and heavy infirmities, G. was summoned before the Inquisition to answer for his heresies. After a wearisome trial and incarceration, his judges condemned G. to abjure by oath on his knees the sublime truths of his scientific creed. This in his age and infirmity he was weak enough to do. The question whether he was put to the torture has been copiously discussed of late (see *Nature*, XVII.), and whether the records of his trial have not been tampered with. His famous whisper, *E pur si muove* ('But nevertheless it does move'), is also by some regarded as a fiction. G. was sentenced to an indefinite imprisonment in the Inquisition, which was soon commuted by Pope Urban, at the request of Ferdinand the Grand, Duke of Tuscany, into permission to reside at Siena, and finally at Florence, should the prisoner's health require the change. In his retreat at Arcetri, he continued with unflagging ardor his learned researches, even when hearing grew enfeebled and sight was extinguished. He died at the age of 78, and was interred by ducal orders in the cathedral of Santa Croce, where a majestic monument symbolizes his great achievements. His disposition was truly genial; he enjoyed with keenness the social wit and banter of his chosen friends, and the generous pleasures of the banquet; and the readiness with which he offered or accepted atonement, modified a somewhat irascible disposition. The great deficiencies in his character were a want of tact to keep out of difficulties, and a want of moral courage to defend himself when involved in them. His biting satirical turn, more than his discoveries in science, was the cause of his misfortunes. The dignitaries of the church who persecuted G., warned him beforehand in the friendliest way to be 'more prudent.' Their conduct in persecuting opinion, rather, in G.'s case, *demonstrated fact*, is of course utterly inexcusable; but gives no reason for the opposite extreme of declaring G. a martyr. It is right to add, that the congregation of the Inquisition by which G. was condemned, is not believed by Rom. Catholics to speak with the plenary authority of their Church, nor are its decisions regarded as infallible even by extreme ultramontanes. G. was of small stature, but of robust and healthy frame; his countenance was attractive, and his conversation cheerful. He loved art, and cultivated especially music and poetry. Ariosto he knew almost by heart, and appreciated keenly the beauties of this great classic. Tasso, on the other hand, he unduly depreciated, and inflicted much pain on the sensitive spirit of the poet by his severe criticism entitled *Considerazioni al Tasso*. His own style is nervous, flowing, and elegant. The best edition of G.'s collected works is by Alberi (16 vols. Flor. 1842-56). See Viviani's Life of G.; Brewster's sketch; M. Chasles's *Galileo Galilei* (1862); Pieralisi's

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Urbano VIII. e G. (1875); Gebler's *G. und die Römische Curie* (1876); Berti's *Copernico e il vicende del Sistema Copernicano* and *Il Processo Originale di G.* (Rome 1876); the *Quarterly Review* for 1878, Apr.; and Riccardi's *Bibliographia Galileiana* (1873) G.'s most important contributions to physical



Galingale (*Cyperus longus*):
a, a spikelet; b, a single flower;
c, pistil; d, end of spikelet in
fruit.

w. by s. of Mansfield, 64 m. n. of Columbus. It has large railroad shops, 4 cigar factories, 2 foundries, large mill, graded school. 10 churches, 3 national banks (cap. \$170,000), 2 wk. newspapers. Pop. (1890) 6,326; (1900) 7,282.

GALIOT, or **GALLIOT**, n. *găl'î-ôt* [F. *galiote*—dim. of *galère*, a galley: OF. *galée*]: Dutch vessel, with main and mizzen mast, and a large gaff-main-sail. Galiots—strong-built, flat-bottomed ships of 400–500 tons—were formerly used as bomb-vessels.

GALIPE'A: see **ANGOSTURA BARK**.

GALIPOT, n. *găl'î-pôt* [F. *galipot*]: a white resinous juice found flowing from fir or pine trees.

GALIUM: see **BEDSTRAW**.

GALIZIN, or **GALLITZIN**: see **GOLITZIN**.

GALL, n. *gawl* [Dut. *gal*; Icel. *gall*, *gall*: AS. *gealla*, *gall*; *gealew*, yellow: Ger. *galle*, *gall*; *gelb*, yellow]: in an animal, a bitter yellowish-green fluid contained in the gall-bladder; bile (see **LIVER**): anything extremely bitter; anger; rancor; bitterness of mind; a neutral salt skimmed off the surface of melted crown-glass. **GALL-BLADDER**, a small

science are recapitulated briefly as follows: 1. The relation between space and time in the case of falling bodies, also the 'three laws of motion;' 2. The path of projectiles is a parabola; 3. The isochronism of the pendulum; 4. That air has weight, also partial discovery that suction is owing to the pressure of the atmosphere; 5. The re-invention of Aristotle's theory respecting sound; 6. The invention of the telescope; 7. The discovery of the satellites of Jupiter, phases of Venus, and spots on the sun. See **PENDULUM**: **FALLING BODIES**: **PROJECTILES**: ETC.

GALINGALE, *găl'in-gāl*: name often applied to the tubers of *Cyperus longus*, and sometimes to the whole plant: see **CYPERUS**.

GALION, *găl'i-on*: city in Crawford co., O.; at crossing of the Atlantic and Great Western, and the Cleveland Columbus Cincinnati and Indianapolis railroads, and junction of the Bellefonte and Indianapolis div. of the latter with the main road; 15 m.

GALL.

sack, pear-shaped, which receives the bile from the liver (see LIVER). GALL-STONE, a concretion found in the gall-bladder (see CALCULUS). GAL'LESS, a. wanting gall or bitterness.

GALL, n. *gawl*, or GALL-NUT [It. *galla*, a bubble, an oak-gall: F. *galle*, a gall-nut—from L. *galla*, the oak-apple]: a hard round excrescence growing round the eggs of an insect deposited in the tender shoots of the oak-tree, etc. (see below). GALL-FLY (see below). GAL'LIC, a. -*lik*, pertaining to or obtained from galls, as *gallic acid* (see below). GALLATE, n. *gāl'lāt*, compound of gallic acid with a base.

GALL, v. *gawl* [OF. *galler*, to fret, to itch; *galle*, a fretting or itching: It. *galla*, scab: Icel. *galli*, a fault or imperfection: comp. Gael. *galar*, disease]: to hurt or break the skin by rubbing; to break any surface by rubbing; to tease; to vex much; to chagrin; to wound the feelings: N. a wound in the skin by rubbing. GAL'LING, imp.: ADJ. adapted to fret or vex; harassing, as a galling fire: N. a fretting or wearing of the skin by friction. GALLED, pp. *gawld*.—SYN. of 'gall, v.': to chafe; rub; wear away; excoriate; vex; fret; harass; annoy.

GALL, n. *gāl* [Gael. *caile*, a vulgar girl; *galad*, a young girl]: in *slang*, a corruption of OE. *callet*, a quean; a girl; a sweetheart: see CALLET.

GALL, or GALL-NUT: hard excrescence growing around the eggs deposited by an insect in the tender shoots of a tree. These growths are of various shapes, but the oak-galls chiefly used in commerce are nearly globular, with slightly pointed excrescences sparingly placed on their surface. They are remarkable for containing a peculiar acid called *gallic*, which is only an altered condition of tannic acid, and their value is due entirely to the great accumulation of this principle in the diseased condition of the vegetable tissue which constitutes the gall. This gallic acid (q.v.) is easily separated in the form of beautiful white acicular crystals, which, after a little exposure, become pale yellow. It is in extensive demand as a fixing agent for photographic pictures. Until this demand was created, only three or four kinds of galls were known in commerce, and these were almost wholly employed in dyeing, the common Turkish galls being also in frequent medicinal use; now, several others are imported in considerable quantities. The following are the chief: 1. The Turkish galls, of two kinds *blue* and *white*; by far the most common in use. They are derived chiefly from Constantinople and Smyrna, to the average annual amount of 300 tons—an enormous quantity when we consider how they are produced, and the industry necessary to collect them. They are each about the size of a round nutmeg, and the blue, which are the best, are entire, being gathered before the escape of the insect. The so-called white galls are of a yellowish-brown color, each perforated with a small round hole, about the sixteenth of an inch in diameter, whence the insect has escaped. These galls are produced by a species of *Cynips*

(*C. quercus-galli*) on the dyer's oak (*Quercus infectoria*) native of Asia Minor from the Bosphorus to Syria, and from the Grecian Archipelago to the frontiers of Persia. Of this kind of gall, several varieties are known in commerce, as the Aleppo; the Syrian or Mosul, which are the best known; the Tripoli Taraplus or Tarablous, obtained from Constantinople, and the Smyrna galls. 2. The small Aleppo or coriander gall, generally about the size of a large pea. They are always perforated or empty galls, and are of brownish-yellow color, round, and with small blunt spines. The export is probably not large.—3. The large Bassorah, Bussorah, or Mecca galls, the largest known in commerce; as large as an Orleans plum; smooth, except a ring of curious slightly raised excrescences sometimes found round the middle, dividing the gall into two hemispheres. They are reddish brown, and are said, when on the trees (*Quercus infectoria*), to be colored as brightly as apples. These are the apples of Sodom, or the Dead Sea apples, bright to the eye, but filled with a gritty astringent matter, likened to ashes; it is formed on the *Quercus infectoria* by *Cynips insana*. These are not extensively exported.—4. The acorn gall, Knopperrn, Knobben, Hungarian, or German gall; found chiefly in Hungary, and much used by German dyers. It is a curious irregular-shaped brown gall, deeply furrowed, and covered with angular excrescences. It is produced on the common oak (*Quercus pedunculata*) by *Cynips Quercus calycis*.—5. The small E. Indian galls called Mahee, and Sumrut-ool-toorfa, obtained from the Indian Tamarisk (*Tamarix Indica*). They are very small, about the size and color of tares, and are so rough and irregular in form, that they resemble little lumps of dried garden soil.—6. The Chinese galls, or Woo-pe-tsze. These very curious vegetable excrescences were regarded only as curiosities some years since, but are now regular articles of commerce. They are of very irregular shape, branching out sometimes like fingers. Their length seldom exceeds two inches; they are rarely more than a quarter of an inch in diameter at the base, where they spring from the tree, but they spread out as much sometimes as an inch and a half or two inches. When broken, they are found to consist of a thin shell, not thicker than a walnut shell, of dark-yellowish or reddish-brown color internally, and semi-transparent; but externally they are covered with very fine down, and consequently resemble the young horns of a stag when just budding. They are produced on the *Rhus semi-alata* (see SUMACH), by an insect not yet known to science. Since the Japanese ports have been opened to commerce there has been considerable export of these curious galls. They are rather more branched, the branches or lobes being smaller than in the Chinese variety, but in other respects they are the same.

A very great many galls are known in most parts of the world, and the oaks yield numerous species, but those above enumerated are the galls of commerce: few others have ever been found to pay the expense of collecting. Galls are extensively used in dyeing, chiefly for the production of

black colors, with logwood and the salts of iron, either for dyeing in the piece, or printing patterns; in each case the material is first submitted to the action of a solution of the galls, afterward to another of the dye-wood and iron salt. Galls are also an important constituent in writing-ink (see INK), and are used in tanning the finer fancy leathers.

GALL, *gawl*, Ger. *gal*, FRANZ JOSEPH: founder of phrenology: 1758, Mar. 9—1828, Aug. 22; b. Tiefenbrunn, near Pforzheim, on the borders of Baden and Würtemberg. He studied medicine at Vienna, and settling there, became known as a practical physician, and by the publication of his *Philosophisch-Medicinische Untersuchungen über Natur und Kunst im gesunden und kranken Zustande des Menschen* (Vienna 1791). But he acquired a much more extended reputation by his lectures on the structure and functions of the brain, beginning 1796: see PHRENOLOGY. His views were so subversive of received doctrines on the subject of mind, that opposition was excited, and the lectures were prohibited 1802 by the Austrian government. With his pupil Dr. Spurzheim (q.v.), who became his associate 1804, G. quitted Vienna 1805, and during his travels through Germany, Holland, Sweden, and Switzerland, expounded his views in many of the universities and principal cities, where he found many adherents as well as opponents. In 1807, he settled as a physician in Paris, and there began lecturing and writing for the propagation of his opinions. As a foreigner teaching science to the French, he was discountenanced by Napoleon. 1808, March 14, he and Spurzheim presented to the Institute of France a Memoir of their discoveries, on which a committee of the members of that body (including Pinel, Portal, and Cuvier) drew up an unfavorable Report. Of this there is a translation in the *Edinburgh Medical and Surgical Journal*, 1809, Jan. G. and Spurzheim thereupon published their *Memoir*, with a reply to the Report, in a vol. entitled *Recherches sur le Système Nerveux en général, et sur celui du Cerveau en particulier; suivi d'Observations sur le Rapport*, etc. (Paris 1809, 4to). This was followed by their larger work *Anatomie et Physiologie du Système Nerveux*, etc. (Paris, 1810–19, 4 vols, 4to), with an Atlas of 100 plates; but the two phrenologists having parted 1813; the name of G. alone is prefixed to vols. III. and IV.; and it alone is borne by a reprint of the physiological portion of the work, entitled *Sur les Fonctions du Cerveau, et sur celles de chacune de ses Parties* (Paris 1825, 6 vols. 8vo). Of the contents of that edition, there is a summary in the *Phrenological Journal*, X. 459. A German translation of it, entitled *Vollständige Geisteskunde*, etc., appeared at Nuremberg 1833; and an indifferent English version by Dr. Winslow Lewis, junior, at Boston, 1835 (6 vols. 12mo). A translation of the chapters *On the Functions of the Cerebellum* is included in a volume with that title, published by G. Combe (Edin. 1838, 8vo). In answer to accusations of materialism and fatalism brought against his system, G. had early published a part of the work under the title of *Des Dispositions innées de l'Âme et de l'Esprit*, etc. (Paris 1812). He continued to practice medicine and pursue

his researches at Montrouge, near Paris, till his death. A catalogue of his collection of skulls, etc., is printed in the *Phrenological Journal*, VI. and VII. As a thinker, he was original and independent; as an observer, industrious and persevering; as a writer and lecturer, forcible and clear. Even those, doubtless the large majority of modern students of mental science, who reject his system as insufficiently borne out by facts, allow that he has conferred signal service on science by his discoveries in the anatomy and physiology of the brain, and that by stirring to the bottom many questions regarding mind, and the organic conditions by which its phenomena are affected, he has contributed to deepen the foundations and broaden the applications of psychology. It is long since the apprehension of danger to religion and morality from his doctrines died away among the intelligent and well informed. In Great Britain and America phrenology became known less through G.'s writings than through those of Spurzheim, who went to England 1814. So early, however, as 1803 it had been criticised in the *Edinburgh Review*, II. 147. See further, *Transactions of the Phrenological Society*, p. 1 (Edin. 1824); *Phrenological Journal*, V., VIII., IX., XI., XV., XVI., XVII., XIX.; *Historical Notice of the Discovery of the Anatomy of the Brain*, appended to G. Combe's *Phrenology Applied to Painting and Sculpture*, p. 151 (Lond. 1855); Professor Laycock on *Mind and Brain*, II. 164, 168 (Edin. 1860).

GALL, St., *säng gäl*: one of the most important manufacturing towns of Switzerland, cap. of the canton of St. Gall, pleasantly situated on the left bank of the Steinach, 2,081 ft. above sea-level, 40 m. e.n.e. from Zürich. It is a well-built town, surrounded by old walls; but the ditch has been filled up and converted into garden-grounds. Among the principal buildings are the Abbey Church, completely modernized in the last century; the monastery, portions of which are now occupied by public govt. offices, and by the convent library, containing 1,506 mss., among which are several of the classics at one time supposed to have been lost: see GALL, St., ABBEY OF. The greatest building is the schoolhouse, which contains a natural history museum and the town library. The manufactures of St. G. are chiefly cotton goods, particularly *Swiss muslins*. It has also linen manufactures, carries on bleaching and embroidery extensively, and is the great mart for the produce of Appenzell and Thurgau. Pop. (1888) 27,390; (1901) 33,363.

GALL, St. (Ger. *St. Gallen*), ABBEY OF: celebrated Swiss Benedictine monastery, which gives its name to the canton in which it is situated. It was founded early in the 7th c. by St. Gall, or Gallus, Irish monk, disciple of Columbanus, one of that distinguished band who in that age from the various monasteries of Ireland and the kindred establishment of Iona carried the elements of learning and civilization over a large portion of the continent of Europe. Gallus had accompanied Columbanus to Anegray and Luxeuil; and ultimately he with a few followers repaired

to Switzerland, where, in a hermitage on the banks of the Steinach, he acquired such fame for sanctity by his teaching and example that on his death there arose in his honor the monastery, which in time became one of the most celebrated of the many magnificent establishments of the Benedictine order. The succession of abbots from the days of Gallus is carefully chronicled, and the share which each had in the erection and enlargement of the monastic buildings. Through the munificence of the faithful, the abbey of St. G. gradually became one of the master-pieces of mediæval architecture; and the genius and skill lavished on its construction, and on the decoration of its halls and cloisters, had a large share in developing the Christian art of the period. The monks of St. G. were among the best friends and preservers of ancient literature. They were indefatigable in the collection and transcription of mss.—biblical, patristic, sacred and profane history, classical, liturgical, and legendary. Some of the mss. still shown in the library are monuments of the skill and industry of the copyists; and several of the classics, especially Quintilian, Silius Italicus, and Amianus Marcellinus, have been preserved solely through the mss. of St. Gall. For a time the abbey was subject to the Bp. of Constance, and an animated dispute was long maintained between that prelate and the monks as to the right of electing the abbot. It ended in the recognition of the right of free election; and ultimately, from the growth of the monastic possessions and the important position which the abbot held, the monastic domain, which comprised a great part of n. Switzerland, became a distinct jurisdiction, within which the abbot, like many of his brethren in the great Benedictine monasteries, exercised the rights of a suzerain. For several centuries the abbey of St. G. held one of the highest places in the order: its members were distinguished among the scholars of mediæval Germany; and many of them, e.g., Notker, are known to have pursued, besides the ordinary learning, physic, mathematics, and astronomy. St. G. was eminent for the cultivation of music, and its mss. have been extensively used by the restorers of ancient ecclesiastical music. A town of considerable importance grew up around the monastery, and was called by the same name; and as the wealth and influence which attached to the dignity of the abbot began to make it an object of ambition to the rich and powerful families, the succession of abbots, in the 13th and 14th c., sadly degenerated from their pious and learned predecessors in the office. A stringent reform was enforced about the time of the Council of Constance; but the burghers of St. G. had grown dissatisfied with the ancient rule; and on the outbreak of the Reformation, 1525, they threw off their subjection, and embraced the new doctrines. At the close, however, of the religious war, 1532, the Rom. Cath. religion was re-established, and the abbot reinstated; though with diminished authority. At the French Revolution the abbey of St. G. was secularized (1798), and its revenues were soon afterward sequestrated (1805). By a later ecclesiastical

GALL—GALLAIT.

arrangement the abbacy of St. G. was raised to a bishopric, which, 1823, was united to that of Chur. They were afterward separated; and, 1847, St. Gallen was erected into a bishopric with a distinct jurisdiction.

GALL, ST., CANTON OF: Swiss canton, bounded n. by Thurgau and the Lake of Constance, e. by the Vorarlberg, s. by the Grisons and Glarus, w. by Zürich and Schwytz. The country mostly is mountainous; the general slope of the surface being toward then. and n.w. Several summits attain a height of 6,000 or 7,000 ft., one (the Gallanda) 8,800, and one (Schirbe) 9,000. The Rhine touches the canton of St. G. near Pfeffers, and for about 50 m. forms its boundary. The chief rivers that intersect the canton are the Seez, the Tamina, and the Thur. Portions of the Lakes of Constance, Zürich, and Wallenstadt, lie within its boundaries. The chief produce consists of fruit, especially apples and cherries, wine, *kirschwasser*, corn, maize, and potatoes. Little grain is produced, and much land is applied to pasture. Iron is found in considerable abundance, and of good quality, at Gunzenberg; and coal, as also peat, is raised within the canton. The manufactures are of linen, muslin, cotton, lace, embroidery, and glass; and wax-bleaching and tanning are extensively carried on. The linen-manufacture is of very old standing: its seat is the chief town of St. Gall (q. v.), celebrated for linens as early as the 13th c.; but in later times the cotton manufacture has almost entirely taken its place.

The erection of St. G. into a distinct canton is comparatively recent. It was formed at the secularization of the domain of the abbot by the union of the abbey territory with several districts previously subject to the older cantons—viz., the Rheinthal, Sargans, Werdenberg, Sax, Gaster, Utnach, together with the town of Rapperschwyl; so that the new canton of St. G. actually incloses on all sides the canton of Appenzell, which forms, as it were, an island within the new district. The language is a Swabian dialect of German. The canton of St. G. sends eight members to the National Council. Its govt. is one of the most democratic in Switzerland. It consists of a Great Council, the members of which are chosen for two years by the votes of all citizens above 21 years; and who appoint from among themselves for four years an executive, called the lesser council, of seven members. The local prefects and other district officers are elected annually in their several dists. The area is 779 sq. m. Pop. (1888) 228,174, of whom about 126,000 were Rom. Cath., and the rest chiefly Calvinists; (1900) 250 285.

GALLAIT, gá-lā, LOUIS: historical painter: b. Tournay, Belgium, 1810, May 10. He was educated in his native city, Antwerp, and Paris, where he lived many years, and exhibited frequently 1835–53. He was elected member of the Royal Acad. of Belgium, received a second-class medal in France 1835, and the decoration of the Legion of Honor 1841, and became a foreign associate of the Paris Acad. of

Fine Arts, succeeding Overbeck 1870. His paintings, large in size and replete with action, include *The Duke of Alba in the Netherlands*, *The Death of Palestrina*, *Job and His Friends*, *Montaigne Visiting Tasso*, *Baldwin crowned Emperor of Constantinople*, *The Abdication of Charles V.*, *The Temptation of St. Anthony*, *The Last Honors paid to Counts Egmont and Horn after their Execution*, and *The Last Moments of Egmont*.

GALLAND, *gâ-lông'*, ANTOINE: 1646–1715, Feb. 17; b. Rollot near Montdidier, in Picardy: French orientalist and numismatist. In 1670 he accompanied the French ambassador, Nointel, to Constantinople, and went to Jerusalem and other places. He returned to France 1675, but subsequently twice visited the East. In 1701 he was made a member of the Académie des Inscriptions, and 1709 prof. of Arabic in the Collège de France. G.'s writings relate chiefly to numismatics; but the work which has given him reputation is his translation of the *Arabian Nights*, 12 vols. (*Mille et Une Nuits, Contes Arabes*, Paris 1704–17). This was the first translation of these grotesque and gorgeous stories ever made into any language of Christendom, and G. was long credited with being the author rather than the translator. Among his writings were *Paroles remarquables, bons Mots, et Maximes des Orientaux* (Paris 1694); and *Les Contes et Fables Indiennes de Bidpai et de Lokman* (2 vols., Paris 1724).

GALLANT, a. *gâl-lânt* [OF. *gallant*; F. *galant*, courteous, gallant—from OF. *galer*, to rejoice: Scot. *callant*, a stripling, a lad: It. *galano*, quaint and gay in clothes; *galante*, brave, handsome—from *gala*, show, festivity]: manifesting bravery; magnanimous; daring; showy. GAL'LANTLY, ad. -*lî*. GAL'LANTRY, n. -*trî*, bravery; intrepidity; polite attention to women—often used in a bad or equivocal sense. GALLANT, v. *gâl-lânt*, to attend and wait on, as on a woman: N. a showy person; one polite and attentive to women; a lover: ADJ. attentive to ladies; courteous. GAL-LANTING, imp. GALLANT'ED, pp.—SYN. of 'gallant, a.': bold; brave; fearless; intrepid; courageous; undaunted; valiant; heroic; splendid; magnificent; chivalrous.

GALLA OX, *gâl la ôks*, or SANGA: remarkable species or variety of ox inhabiting Abyssinia. The chief peculiarity is the extraordinary size of the horns, which rise from the forehead with an outward, and then an inward curve, producing a lyre-shaped figure, and finally curve a little outward at the tip, to which they taper gradually. In a specimen presented by Mr. Salt to the Museum of the College of Surgeons in London, the length of each horn measured round the outer side is three ft. ten and a half inches, the circumference of each at the base is one ft. three inches, the distance between the tips three ft. four inches. A space of about three or four inches between the horns is occupied by a tuft of hair. Bruce represents the enormous growth of the horns as a kind of disease or monstrosity, accompanied with emaciation of the animal. Salt controverts this account, yet figures the animal so as

GALLARATE—GALLAS.

rather to confirm it. The G. O., however, differs from the common ox in having a hump on the shoulders, in the



Galla Ox (copied from Vasey's work on *The Ox*).

abrupt descent of the back toward the tail, in the greater length of the legs, and in the narrower space between the horns.

GALLARATE, *gâl-lâ râ'tû*: market-town of n. Italy, province of Milan, on the e. side of the Somma hills, 24 m. n.w. of Milan. It is well built, has ancient walls and extensive steam cotton-mills. Pop. 6,000.

GALLAS, *gâl'lâz* ('invaders'). race inhabiting the s. and e. of Abyssinia. The general name by which the tribes designated themselves is *Oroma* (*orma*, men). Although generally of the negro race, they are not purely negroes, but with the Fulahs (q.v.), Mandingoes, and Nubas, form the transition to the Semitic variety, and seem to belong to that great family inhabiting e. Africa, from the frontiers of the Cape land to Abyssinia. usually denominated the Kafirs. The G. are a vigorous, well-formed people. of dark-brown color, with hair frizzled, but not quite woolly, round faces, and small sharp eyes. and are distinguished not less by their energy and warlike spirit, than by their mental capacities. They appear in history first in the 16th c. as a barbarous people, extending their conquests from the interior of Africa, laying waste by constant incursions the countries of e. Africa, to the mountains of Abyssinia, gradually subduing or expelling the original inhabitants (hence their name), occupying great part of Abyssinia, and advancing as far as the Red Sea and the Gulf of Aden. It is only of late years that their power in Abyssinia, and their incursions into that country have been partially checked, chiefly by the vigorous government of the king

GALLATE—GALLATIN.

of Shoa, who subdued some of the G. tribes, and induced them to profess such Christianity as exists in Abyssinia. They still, however, occupy many districts of Abyssinia, and extend their power to an indefinite extent over the countries s. and s.w. of it. Politically, the G. do not form a nation, but are divided into numerous tribes, forming separate kingdoms and states, frequently at war with each other. Most of the G. follow pastoral avocations. Some through intercourse with the semi-christian, semi-civilized Abyssinians, have become tillers of the soil. The wandering G. are engaged mainly in hunting and the slave-trade. The larger number of the G. are still heathens, though Mohammedanism has lately made progress among them. Their religion resembles that of the Kafirs.—Compare Jomard, *Notices sur les Gallas* (Paris 1839); Beke, *On the Origin of the Gallas* (London 1848).

GALLATE: see under GALL 2.

GALLATIN, *găl'a-tîn*. ABRAHAM ALBERT ALPHONSE: 1761, Jan. 29—1849, Aug. 13; b. Geneva, Switzerland; of an old family known in Savoy 500 years before: financier and statesman. His parents died while he was young, nevertheless he received a good education at the College of Geneva, where he graduated 1779. In 1780 he came to the United States, then struggling for independence, and eagerly embraced their cause. He landed in Mass., and offered his services to Capt. John Allen, and so distinguished himself that he was speedily appointed commandant of Fort Passamaquoddy on the coast of Maine. When peace was restored 1783, he became teacher of French in Harvard College, but receiving his paternal inheritance soon afterward, purchased land, first in Va., and then in Penn., where he occupied himself with agricultural pursuits. He entered political life again 1789, when he was appointed a member of the convention for revising the state constitution of Pennsylvania. He was of the anti-federalist party; yet in 1793 he was elected a member of the U. S. senate from Penn., receiving the votes of both parties; but was refused his seat on a technicality. He was elected to the U. S. house of representatives 1795. In 1801 Pres. Jefferson appointed him sec. of the treasury, in which post he was of signal service to his adopted country, and showed financial ability of the highest order. In 1809 he became sec. of the treasury under Pres. Madison. He was one of the three commissioners for negotiation of peace with England 1814, and signed the treaty of Ghent. 1815–23 he was U. S. minister at Paris, and 1826 he was sent to London as ambassador extraordinary. On his return 1827, he settled at New York, and applied himself to literature, chiefly history and ethnology. 1831–39, he was pres. of the National Bank; and 1843 to his death, pres. of the New York Historical Soc. He was one of the founders, and first pres. of the Ethnological Soc. of America.—G. had great strength of character and marked intellectual force. His manner was somewhat reserved and austere. His services to the country merit grateful remembrance.

GALLAUDET—GALLEON.

GALLAUDET, EDWARD MINER: an American educator; b. 1837, Feb. 5, son of Thomas H. G. He organized the Columbia Institution for the Deaf, Dumb and Blind, at Washington, D. C., 1857, and five years later founded and became president of the Gallaudet College for the deaf, and there taught moral and political science. In 1886 he accepted an invitation of the British government to appear before the Royal Commission in the interest of the education of deaf mutes. He wrote *Life of Thomas Hopkins Gallaudet*, etc.

GALLAUDET, gāl-aw-dēt, THOMAS, D.D.: Prot. Episc. clergyman: b. Hartford, 1822, June 3; son of Thomas Hopkins G. He graduated at Trinity College 1842, was a teacher in the New York Institution for Deaf-mutes 1843-58; was ordained deacon in the Prot. Episc. Church 1850, June; priest 1851, June; founded and became rector of St. Ann's Church, New York, for deaf-mutes, 1852, of which church he still (1889) has charge, was appointed gen. manager of the Prot. Episc. Church Mission to Deaf-mutes 1872, pastor of the Sisterhood of the Good Shepherd 1869, chaplain of the Midnight Mission 1871; and founded the Gallaudet Home for Deaf-mutes, near Newburg, N. Y., 1885. He received the degree D.D. from Trinity College 1862; died 1902, Aug. 27.

GALLAUDET, THOMAS HOPKINS, LL.D.: 1787, Dec. 10—1851, Sep. 9; b. Philadelphia: educator. He graduated at Yale College 1805, was tutor there 1808-10, studied at Andover Theol. Seminary 1811-14, was licensed to preach 1814, founded and became supt. of the American Asylum for Education of Deaf-mutes at Hartford; studied the systems of deaf-mute instruction in London, Edinburgh, and Paris 1814-16 (see DEAF-MUTES); and held the office of pres. of the institution 1817-30, resigning on account of ill health. He retained a seat in the directory of the asylum till death, and also was chaplain of the Conn. Retreat for the Insane from 1838 till death. He published numerous sermons, addresses, and juvenile works, and edited 6 volumes of *Annals of the Deaf and Dumb*.—His son, EDWARD MINER G., PH.D., LL.D. (b. 1837, Feb. 5), founded the National Deaf-mute College, Washington, 1864, and has since been its pres. and prof. of moral and political science.

GALLE, POINT DE: see POINT DE GALLE.

GALLEASS, n. gāl'lē-ās [F. *galeace*, or *galeasse*: It. *gal-learza* (see GALLEY)]: a low-built vessel having both sails and oars; a vessel about a third larger than an ordinary galley, and rowed by 300 galley-slaves.

GALLEGO, gāl-yā'gō: one of the principal affluents of the Ebro. It rises at the s. base of the Pyrenees in the province of Huesca, Spain; flows s., and after a course of about 90 m., joins the Ebro a mile below Zaragoza.

GALLEGOS, gāl-yā'gōs: inhabitants of Galicia (q.v.), former n.w. province of Spain.

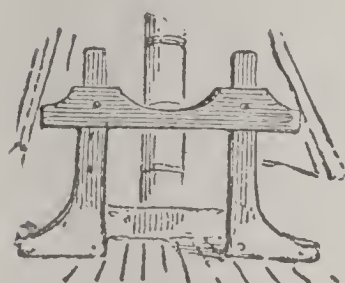
GALLEON, n. gāl'lē-ōn, or GALLOON, n. gāl-lôn' [Sp. *galeon*; It. *galleone*, a great galley (see GALLEY)]: name ap-



Ancient Galley.



Galley.



Gallows-bitts.



Coin of Allectus, showing a Roman Galley.



Gall-fly.—a, Oak-gall produced by *Cynips quercus-folii*; b, Section of gall; c, Gall-insect (*Cynips quercus-folii*).

GALLERIA—GALLEY.

plied formerly to ships-of-war of three or four gun decks, but subsequently, to the large merchant-vessels which every year brought to Spain the gold, silver, and other wealth contributed by its Mexican and South American colonies. They were armed, but being heavy unmanageable vessels, and of immense value, were eagerly sought as prizes whenever a war broke out.

GALLERIA, n. *gāl-lēr'ī-a* [L.L. *galeria*, a gallery, from the covered passage which the larva makes with wax in the beehives which it invades: Agassiz derives the name from Gr. *galeros*, pleasant]: typical genus of the *Galleridæ*, a family of moths, tribe *Pyratidina*. Two species live in beehives, doing great damage.

GALLERY, n. *gāl'lēr-ī* [F. *galerie*, gallery, lobby—from mid. L. *galēriā*: Lang. *galarié*, the rails of a staircase: Sw. *galler*, lattice]: long apartment serving as a communication to others; any long passage; the upper seats in a theatre; the raised floor round a church or public building (see below); collection of paintings, etc., and the place where they are arranged for inspection; in *mining*, a working drift or level from which the mineral has been excavated; in a *large ship*, a sort of balcony projecting from the stern or stern-quarters; an adjunct to the principal cabins; in *mil.*, covered passage formed through the earth or masonry in a fortification, either as a means of communication, or as a position whence a musketry-fire can be maintained through loopholes. For the latter purpose, galleries are formed occasionally in the counterscarps of dry ditches, where their defenders exercise a flanking fire upon the ditch. For listening galleries, see **MINES**, **MILITARY**.

GALLERY, in Architecture: long passage or corridor or room; long passage in the thickness of the wall, or supported on cantilevers (as the Whispering Gallery of St. Paul's, London). Galleries were very frequent in the buildings of the middle ages. The Roodloft (q.v.) is a gallery running across a church at the entrance to the choir, and supporting a large cross. Organ galleries also are frequent, either in the position of the roodloft, or at one end of the nave or transept, or corbelled out from the side-wall. In old baronial halls, the end next the door was usually screened off for the domestics, and above the screen was almost invariably a gallery for musicians. In the older German and French churches, the side-aisles were divided into two stories—the upper forming a gallery said to have been for the exclusive use of the women. The arrangement of galleries in tiers one over the other, now usual in theatres, and seen in some churches, is entirely modern, dating from the 17th century.

GALLEY, n. *gāl'li* [Icel. *galleyda*; mid. L. *galeida*: It. *gallera*, a galley: OF. *galie*; F. *galère*, a galley]: a one-decked vessel navigated with sails and oars, used in the Mediterranean; a light open boat, especially the captain's boat in a ship of war, usually propelled by six alternate oars; the kitchen or cooking-room of a vessel; in *printing*, the frame which receives the types from the composing-stick

GALLEY—GALL FLY

[*F. galée*]. THE GALLEYS, n. plu. *gāl' līz*, galleys used as a place of punishment—galleys being generally rowed by slaves and criminals. GALLEY-SLAVE, a person condemned for a crime to work in a galley: see BAGNES.

GALLEY: long, low-built, narrow ship with one deck, much used in the Mediterranean prior to the introduction of steam, and still extant there. Galleys are propelled by sails and numerous oars, the latter being usually worked by convicts or galley-slaves, who are chained to them. The largest vessels of this class were those of the Venetians, some having a length of 162 ft., and carrying 12 guns; of these, *half-galleys* and *quarter-galleys* were diminutives. From their small elevation above the sea and swift movement, they were formidable enemies, even to much larger vessels, when smooth water gave play to their evolutions. During the great French war, numberless galleys, fitted as gun-boats, were ready to issue from the Mediterranean ports of Spain and France whenever a British ship was becalmed or disabled near the shore. The celebrated Algerine corsairs committed most of their piracies in swift galleys, commonly rowed by the forced labor of Christian slaves. *The galleys* long formed the severest form of punishment in France short of death, and were abolished 1748: see BAGNES.

GAL'LEY HALF'PENNY: coins of Genoa, brought into England by the galley-men, or men that came up in the galleys with wine or merchandise, and thence called galley halfpenny. They were broader than the English halfpenny, but not so thick, and probably base metal, because, by 11 Hen. IV. c. 5, and 13 Hen. IV. c. 6, galley halfpence were prohibited as a legal tender. The galleys unloaded at the e. end of lower Thames Street, thence called Galley Quay, where, in the 17th c., were struck tradesmen's tokens, called Galley Quay halfpence (Timbs).

GALL-FLY (*Cynips*): Linnæan genus of insects, now forming the family *Gallicolæ* [Lat. gall-inhabiting] of entomologists, and belonging to the ord. *Hymenoptera* (q.v.), section *Terebrantia* [Lat. boring], which section is characterized by the females being furnished with an *ovipositor*. Gall-flies are nearly allied to ichneumons, but differ from them principally in depositing their eggs not in the bodies of the larvæ of other insects, nor in their nests, but in plants on whose juices their larvæ are nourished. The ovipositor of the female is long, slender, in part spirally rolled up when not in use, and lodged in a groove on the under-side of the abdomen, near the origin of which it is attached; it has at its extremity lateral teeth forming a kind of saw. By means of this organ, the insect makes a minute puncture where she is to deposit her egg, which is sometimes in a leaf, and then generally in one of the ribs of the leaf; sometimes in a young shoot or twig; sometimes in a bud, or in some other part of a plant, not excepting the roots; each species of gall-fly choosing some particular plant, and some particular part of a plant, to which it confines its attacks. An irritant fluid is supposed to be lodged in the

GALLI.

puncture with the minute egg, as a tumor immediately begins to form, becoming an excrescence known as a *gall*: see GALL, or GALL-NUT. The egg itself increases in size before it is hatched; the gall very rapidly attains



Bedeguar gall of Wild Rose.

its full dimensions; and within it the larvæ of the gall-fly feeds on the juices of the plant in their most concentrated form; for galls are found to contain the peculiar principles of the plants on which they grow in greater



Various kinds of Galls:

a, oak-apple gall; b, b, berry-shaped galls on oak leaf; c, currant galls; d, gall-fly, magnified.

abundance than the adjoining or other parts. It is not until the larva has undergone its transformations, first into the *pupa*, and then into the perfect insect, that it eats its way out of the gall in which it has previously existed.

GALLI, n. *gāl'ī* [L., said to be from *Gallus*, river in Phrygia, which made those mad who drank of it]: in *Rom. antiq.*, priests of Cybele at Rome. They carried round the image of Cybele like people in a state of frenzy, rolling their

GALLIARD—GALLIC ACID.

heads, beating their breasts to the sound of flutes and uttering dreadful predictions. The Galli alone of all the heathen priesthood, in ancient Rome, were permitted to ask alms from the people. GALLIAMBIC, n. *gál-lĩ-àm'bík* [L. *galliam-bicus*, song used by the Galli or priests of Cybele]: kind of verse, consisting of two iambic dimeters catalectic, the last wanting the final syllable.

GALLIARD, n. *gál'yárd* [F. *gaillard*, sprightly, merry—from *gai*, sprightly: comp. Gael. *gille*, a youth; *araideach*, joyous, merry: Ir. Gael. *galach*, valiant, brave]: in *OE.*, a gallant, gay, lively man: [Sp. *gallarda*, an airy Spanish dance]: in *OE.*, a lively, nimble dance; the same, according to Brossard, as the *Romanesca*, a favorite dance with the Italians. The air is mostly in $\frac{3}{8}$ or $\frac{3}{4}$ time, but sometimes in $\frac{2}{4}$ or $\frac{4}{4}$ time. The tempo is also quick and lively, with a flowing melody. A writer in *Notes and Queries* (VII. 216, 217) says that he knows at least a hundred different G. tunes, distinguished by different names, probably to indicate with whom they were favorites, such as *The King of Denmark's Galliard*; *The Earl of Essex's Galliard*; etc.

GALLIATE, *gál-lě-á'tā*: town of n. Italy, province of Novara, 4 m. from the city of Novara. It has a mean appearance, with an old castle and an old church. Silk-mills are here. Pop, 7,000.

GALLIC, a. *gál'lik* [L. *Galliā*, Gaul, ancient name of France]: pertaining to Gaul or France; also GAL'LICAN, a. -ĩ-kăn. GAL'LICIZE, v. -lĩ-sĩz, to render French. GAL'LICISM, n. -lĩ-sĩzm, a French idiom or form of expression.

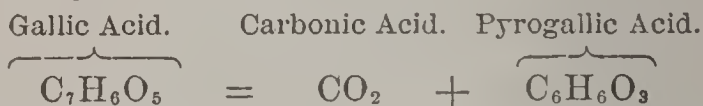
GAL'LIC ACID ($C_7H_6O_5 + H_2O$): acid obtained from galls and other vegetable growths. It occurs in the form of colorless silky needles which lose their water of crystallization at 212° ; they dissolve slightly in cold water, but require only three parts of boiling water for their solution, and are freely soluble in alcohol. Solutions of G. A. have an acid reaction and a sour astringent taste; with the persalts of iron they yield a deep blue color, and no apparent reaction occurs when they are mixed with a solution of gelatine. The gallates of the alkalies, especially if an excess of the base be present, speedily absorb oxygen, and become brown when exposed to the air; hence they may be usefully employed in gas analysis. see GASES, ANALYSIS OF. G. A. has the property of reducing the salts of gold and silver, and on this account has been used in photography.

G. A. exists ready formed in small quantity in gall-nuts, in valonia (acorn-cup of *Quercus agrifolia*), in divi-divi (pod of *Cesalpinia coriaria*), in sumach, and other vegetables. It is formed in association with glucose from Gallotannic Acid (q.v.), when the latter is boiled with dilute sulphuric or hydrochloric acid; it is produced likewise by boiling a solution of gallotannic acid with caustic alkalies, or (more slowly) by simply exposing a solution of gall-nuts to the air, the process of oxygenation being apparently favored by the presence of a ferment contained in the gall-nut. To obtain gallic acid, mix powdered gall-nuts with water, and

GALLIC ACID.

expose them freely and for a long time to the air at a temperature of 70° or 80°. The tannin or gallotannic acid becomes gradually converted into gallic acid. Pour away the supernatant brown fluid and take up the gallic acid from the residue with boiling water, decolorize with animal charcoal, and crystalize.

When G. A. is exposed to a temperature of 410° to 420°, it is converted into carbonic acid and *Pyrogallie Acid* (q.v.) ($C_{12}H_6O_6$), which is sublimed, 31 or 32 parts of the latter acid being yielded by 100 of gallic acid. The reaction is represented by the formula—



If G. A. is mixed with five times its weight of oil of vitriol, a crimson solution is formed, which if gradually dropped into water. deposits a red substance, partly in granules and partly in crystals. The crystals are *Rufigallie acid* ($C_{14}H_8O_8$).

G. A. is used in medicine as an astringent: some have regarded it as the best of all styptics in all cases of internal hemorrhage, whether hemoptysis, hematemesis, or hematuria. The symptoms of Bright's disease of the kidney also have been alleviated by its use. It may be given in doses of from three to ten grains three or four times a day. As a topical agent in arresting hemorrhage from external wounds, it is greatly inferior to tannin.

GALLICAN CHURCH, *găllô-kôh*, distinctive title of the Roman Cath. Church in France. It is the Church of France, considered in its relation to geographical boundaries though in its constitution and principles of church government. The Christian faith was widely diffused in France or Gaul even during the lifetime of the apostles, and it speedily flourished among the descendants of the Greek colonies of the south, and in the numerous towns and cities on the Rhodan and its confluent rivers. In their persecutions for which the early professors of Christianity were subjected, the Christians of these churches had the full share and one of the most distinguished monuments of early Christian literature is the letter of the Christians of Lyon and Vienne to their brethren in Asia, on the martyrdom of these churches, which Eusebius has preserved in his *Ecclesiastical History* (book v. c. 1). Although sharing in the general literary inferiority of their Eastern brethren which characterizes Western ecclesiastics during the early period, the church of Gaul numbers several eminent names in the literature of the 3d, 4th, and 5th c. The works of Irenæus, Bishop of Lyon, rank among the most important for the history of doctrine of all the early patristic remains; and in the following century Sulpicius Severus, Hilary of Poitiers, Hilary of Arles, Vincent of Lerins, Prosper, Nicetius, Eucherius, Salvian, and Gregory of Tours, combined for a quantity of literature of which the later modern representative of the French Church are reasonably proud. The history of organization, also, of the church of Gaul was, more or less, a period among the most complete and regular throughout the churches of western Christendom, and in the council at Arles in 314 may be recognized the titles of many bishops of sees still represented in the catalogue of the French episcopacy, and of a hierarchy not so much. But the history of the Church, so far as regards the development of those peculiar principles which have acquired a distinctive name and status in Rom. Cath. theology, begins at the middle of the period for the origin and progress of the temporal power of the papacy; see *Papacy*. It is enough here to observe that from circumstances differently viewed by the opposite schools of theology, the Roman pontiffs began from the very date of the establishment of the Western Empire, to exercise a large and widely extended influence over the civil as well as ecclesiastical affairs of the several European kingdoms. On the other hand, owing to the intimate connection between the church and state in most of these kingdoms, and especially to the feudal relations between the crown and the church dignitaries, most of whom held the temporalities of their benefices under the crown as a kind of ordinary feudatory tenure, the crown also asserted a considerable claim to certain privileges in respect to ecclesiastical affairs. The satisfactory adjustment of these conflicting claims was the great problem of medieval policy and the alternations of the struggle between them form the staple of mediæval history. More than one of the French sovereigns engaged in a conflict with the Roman see as to the respective authority of the two powers; these

conflicts naturally called out a division of opinion among the members of the church of France, one party supporting the papal claims, and the other maintaining the adverse prerogatives of the French crown, and the privileges of the national church of France. The latter party, professing to represent the rights of the G. C., have given a name to the principles which they profess; and the appellation of Gallicanism has come to designate, in general, that system in Rom. Cath. theology which, while it recognizes the primacy of the Roman pontiff, by divine right, over the universal church, yet asserts the independence of national churches in many details of self-government and of local discipline, and limits the exercise of the papal prerogatives by canons and decrees of general councils and by the laws of the universal church. It must be added that, while the Gallican theory to this extent claims an exemption from dependence upon the authority of the Roman pontiff, it acquiesces, on the other hand, to an almost proportionate degree, in the assumption of ecclesiastical authority on the part of the state. Gallicanism, in truth, in many of its details, falls into the grossest form of Erastianism.

We can recognize the working of these principles in the opposition which the so-called Isidorian Decretals (see ISIDORIAN DECRETALS: HINCMAR) encountered in France; and though the body of the clergy stood aloof, these principles were carried to their extreme extent by Philippe le Bel (or Philip the Handsome) in his contest with Boniface VIII. The conflicting claims of the rival popes in the Western Schism (see WESTERN SCHISM) tended still more to weaken the papal authority; and the expedient then adopted for the extinction of the schism—viz., that of convening a general council to pronounce upon the respective claims of the pretenders to the papacy, gave prominence and significance to what has since been regarded as one of the leading dogmas of Gallicanism—the superiority in point of authority of a general council to the pope. The details, too, of the disciplinary enactments of the councils of Constance and Basel, which were drawn up in this spirit, were directed mainly toward the limitation of the papal authority in the exercise of church patronage within the limits of the national church; and these enactments were in the main embodied into the French law by the celebrated Pragmatic Sanction of 1438: see PRAGMATIC SANCTION.

The Pragmatic Sanction was superseded 1512 by the concordat of Leo X. with Francis I. The patronage which the French crown held under that concordat had the effect of still further nationalizing the French Church, and increasing at once the subserviency of the clergy and the jealousy of the crown as to the papal interference. The great jurists, Pithou and Dupin, in asserting the liberties of the church, equally enforced the privileges of the crown. In the development of the absolutism of the monarchy, which reached its height under Louis XIV., the ecclesiastical prerogative of the crown was enlarged as much as its political authority; and a contest between this

GALLICAN CHURCH.

monarch and Innocent XI., on the right of the crown to the so-called *Droit de Regale* (see REGALIA), led to the well-known Declaration of the French Clergy 1682, since regarded as the charter of Gallicanism. This formulary emanated from an assembly of the French clergy, held by royal authority 1682, at which the celebrated Bossuet was present. It consists of four articles. The first declares that 'the jurisdiction of St. Peter and his successors in the Roman see as vicars of Christ on earth, though divinely bestowed, is confined to things spiritual and appertaining to salvation, and does not extend to civil or temporal affairs.' The article therefore declares 'that princes are not subject in temporal things to any ecclesiastical authority;' that they cannot be deposed 'either directly or indirectly by the power of the keys, and that their subjects cannot be dispensed from their subjection or released from their allegiance.' The second article renews the declaration of the Council of Constance with regard to the superiority of a general council over the pope, and declares that that article is not to be restricted in its application to a period of schism such as existed at the time of the council. The third asserts that the authority of the pope is 'to be restricted by the canons of the universal church,' and that 'the rules, customs, and institutions of the Gallican kingdom and church remain in full force.' This is the article which asserts the celebrated 'Gallican Liberties.' The fourth article, while it concedes to the pope 'the chief part in questions of faith,' and professes that 'his decrees extend to each and every church,' nevertheless maintains 'that his judgment is not irreformable, unless it shall have been confirmed by the consent of the entire church.' The chief rules, customs, and institutions of the G. C. referred to in the third article are, that the G. C. does not receive all the decrees of councils and of popes in matters of discipline, and that those only are in force which are so received; that the G. C. holds itself free to receive or reject the rules of the Roman chancery; that the Roman pontiff cannot levy any impost from the French clergy without their own consent; that he cannot bestow of his own motion on a foreigner any benefice within the French Church; that neither he nor his legates can hear French causes in 'the first instance,' and that even in cases of appeal he is bound to assign native judges to hear the appeal, even when the appellant is a metropolitan or primate; that the French bishops shall not be required to attend any general council unless with the permission of the crown. The last of these 'customs,' as also those which make the receiving or not receiving the general canons of discipline optional in France, and which practically throw the decision into the hands of the civil power, have been with much show of reason denominated the 'Slaveries,' rather than the 'Liberties' of the Gallican Church.

This 'Declaration' was strenuously enforced by Louis XIV.; but it was in the same proportion distasteful to the popes. It was condemned by Alexander VIII. 1690, by Clement XI. 1706, and by Pius VI. 1794; but both the

acceptance of the articles and their condemnation were understood to be with certain reservations. Within the present century, and especially since the late collision between the civil and ecclesiastical authority, the opinions of the French clergy underwent a decided change, and the Gallican doctrines were much less copiously held, and in a less extreme form, and where the same doctrines were adopted in other national churches, and especially in Germany (see FEUDONIANISM), under Joseph II. they fell into similar discredit with the church party. The climax of this reaction has been seen in the conduct of the French bishops at the late Vatican Council, in which a great body of them were foremost in reproaching the Gallican articles, and accepting the doctrine of Papal infallibility, and even those who contended for the opposite view, in the end acquiesced in the decision of the majority against them.

GALLIENUS, *gallienus*, **PEPPIUS**, **LETTICUS**, Roman Emperor: d. 268 (reigned 260-268); son of Valerian who had made him co-regent with himself and who was taken prisoner by the Persians 260. G.'s authority was limited almost entirely to Italy, for throughout the provinces the legions for the most part revolted, and raised their commanders to the dignity of Cæsar. Hence the period is known in history as the Time of the Thirty Tyrants. In the East, the honor of the Roman arms was maintained by Aurelian, Probus, and others, who found a respite only in Odenathus, ruler of Palmyra, and his wife Zenobia (q.v.), to whom G. entrusted the care of the war against the Persians. In the West, however, dangers thickened about him. Auréolus was proclaimed emperor by the regions of Illyricum, and having marched into Italy, seized Meda, and proceeded toward Rome. The war between the two was carried on for some time with undecided success, but G., while besieging his adversary in Meda (Milan), was murdered by some of his officers. He was succeeded by Claudius II. (q.v.)

GALLIET, GASTON, ALEXANDRE AUGUSTE, Marquis de; a French military officer b. 1831 in Paris; entered the army 1848; commissioned colonel 1867; served in the army of the Rhine in command of the 3d Regiment of Chasseurs d'Afrique, through the Franco-German War; promoted to the rank of general of brigade 1870; and in the second siege of Paris commanded a brigade of the Army of Versailles. In 1871 was sent to Africa and placed at the head of the sub-division of Batna; commanded the expedition to El-Ghiah, Africa, and subdued the revolting tribes; on the reorganization of the army was placed in command of the 3d brigade of infantry of the 8th army corps of the sub-division of the Department of Cher; given command of the 5th division of infantry, 1875; and became commander of the 9th corps, 1879. In 1885 he was member of the council of war and in 1890 became minister of war.

GALLIGASKINS, *gal'igaskins*, **Dr. Gregresque**, Greek or Grecian; comp. *galligalle*, a youth; *gaskan*, an

GALLINAE OR GALLINACEOUS BIRDS.

appendages; leather protectors on hose for the legs of sports men during shooting excursions, etc.; loose wide breeches, such as the canvas overalls worn by fishermen, etc.

the GALLAMAUTRY, hog and man flesh. *gail*, a hawk, *ma*, a potch: comp. Gael. *gail*, to boil or stew; *maith*, good. *gail-maith*, a little bit of Oze, a stew or boiled dish, by all the people; a dish made of omnivore chopped up a ridiculous method of a woman of a mixed character, exhibiting an ungoverned other, with no good in it, but the toes furnished with

GALLINACEOUS BIRDS

generally valuable to man than any other order, containing at once the most important species domesticated as poultry and those most sought as game. The common domestic

The Gallinaceous birds may be regarded as a type of the order. They have a small head, a rather short bill with the upper mandible a little inclined; nostrils on the sides of the bill; and usually in a soft membranous space at its base; the figure bulky, the wings short, and not governed by powerful muscles, not adapted for long, or rapid flight; the feet with three toes before, and one behind, which is articulated higher than the others, and is sometimes wanting, adapted for walking on the ground and for scraping, which is much resorted to, to procure food and for other purposes, the digestive organs complex. The crop large, the gizzard very muscular, the intestine long, with two very large caeca. The head, at least of the males, is generally furnished with appendages, as a crest, comb, beakles, etc. The feet of the males are also furnished with spurs, and at least during the breeding season the males are very quarrelsome. The males of many species are birds of complete plumage, that of the females is sober, but females of every advanced age often assume a plumage similar to that of the males. Some of the gallinaceous birds are polygamious, some pair at the breeding season; the rest of all is artless, and the males take no part in incubation nor in the rearing of the young. The young are comparatively feathered when hatched, and are immediately able to run about and pick up food for themselves, but are for some time affectionately tended and protected by the mother, and she has the proper food is sought for them and pointed out to them or broken into sufficiently small pieces and laid before them. The Gallinæ have numerous voices. Except the outcast cock, they wander their business the ground. Some of the more popular in almost all parts of the world. Besides those already mentioned, as partridges, grouse, partridges, quails, ptarmigans, peacocks, turkeys, guinea-fowls, tragopans, and tinamous, are examples of this order. Pigeons are generally ranked by ornithologists, but differ notably from them as they differ but a little from the true Gallinæ. Interesting analogies have been pointed out between this order of birds and the order of Ruminants among Mammals in the complexity of the digestive organs, bulkiness of the frame, low intelligence, tensity domesticity,

GALLINULE—GALLIPOLI.

tion, usefulness to man, and proneness to variation from the influence of external circumstances, giving rise to different breeds. GALLINACEI, n. plu. *găl' lî-nă'sê-î*, that section of rasorial birds of which the common barn-fowl is a typical example.

GALLINULE, *găl' lî-nûl* (*Gallinula*): genus of birds of the family *Rallidæ*, closely allied to the Coots (q.v.), and having the upper mandible similarly extending on the forehead in a naked soft plate, but the toes furnished with an undivided narrow marginal membrane. This membrane, however, and the great length of the toes, enable the gallinules to swim well, and all are aquatic. The species are numerous, some confined to tropical regions. The COMMON G. (*G. chloropus*) is known also as the WATER-HEN, or MOOR-HEN, a very widely diffused species, found in most parts of the world. The G. is about 13 inches in length, the tail very short; the general color of the plumage deep olive brown on the upper parts, blackish gray beneath, the ridge of the wing and the under tail-coverts white. The bill is red at the base, and yellowish green at the tip; the legs and toes green. In situations favorable for them, such as artificial ponds, gallinules are sometimes seen in considerable numbers together, swimming with a peculiar nodding of the head. They seek their food both on the surface of the water and by diving, partly also among the grass of meadows and river-banks. A frequent jerking of the tail is very characteristic of them. When alarmed, they sometimes seek safety by flight, but more frequently by hiding among rushes or reeds. They make their nests near the water which they frequent, and usually on the ground among stumps, roots, and reeds; the nest contains seven to ten eggs. The flesh is well flavored.

GALLIO, *găl' lî-o*, JUNIUS ANNÆUS: proconsul of Achaia under Claudius A.D. 53-4. He was son of Annæus Seneca, noted rhetorician of Rome; and Lucius Annæus Seneca, philosopher, and Lucius Annæus Mela, geographer, were his brothers. His own name was Marcus Annæus Novatus, but on being adopted by Junius Gallio, the rhetorician, he assumed his name. His early education was conducted by his father at Cordova, and he rose to such favor that he became proconsul of Achaia, with residence at Corinth, A.D. 53. Little is known positively about him beyond the brief narrative in Acts xviii. 12-17. It is believed that G. was banished to Corsica with his brothers by Messalina, and recalled by Agrippina, who chose Seneca to become Nero's teacher. He was in Rome in the fifth year of Nero's reign, and is said by Jerome to have committed suicide A.D. 65.

GALLIOT: see GALIOT.

GALLIPOLI, *găl' lîp'o-lê* (*Callipolis* of the Greeks): important commercial town of s. Italy, the province of Lecce, beautifully situated on the e. shore of the Gulf of Taranto, on a steep isolated rock in the sea, connected with the mainland by a fine arched bridge of stone. It has a good harbor, although somewhat difficult of access, because

GALLIPOLI—GALLIPOLIS.

of the rocks surrounding its entrance; in time of war is an important position, being strongly protected by fortifications and a castle, as well as by peculiarity of its site. G. is remarkable for its oil-tanks, excavated in the solid limestone, in which the famous oil of Puglia is deposited for exportation. In one year the revenue from the oil-trade amounted to more than 8,000,000 francs. G. is the see of a bishop. Other interesting features of the place are the ancient fountain, a fine monument of antiquity, adorned with antique figures in bas-relief; the castle, erected by Charles of Anjou, commanding the port and bridge, and of considerable defensive strength; and the cathedral, erected 1629 by Francesco Bischettini, containing some fine paintings of Coppola.—It is said that Christianity was introduced here as early as A.D. 44. In 450, the town was sacked by the Vandals; 1284, it was destroyed and almost depopulated by Charles of Anjou; and during subsequent centuries, suffered severely from the Venetians, French, Spaniards, and Turks. See *Viaggi in Sicilia ed in Galeipoli*, by Baron Riedesel. Pop. over 10,000.

GALLIP'OLI: important town and seaport of Turkey in Europe, province of Adrianople, on the peninsula of G., at the n.e. extremity of the strait of the Dardanelles, 90 m. s. of Adrianople, about 130 m. w.s.w. of Constantinople. It was formerly fortified, but its only defense now is 'a sorry square castle with an old tower.' G. is poorly and irregularly built, and its streets are dirty, but its bazaars are extensive and well stocked. It is the most important town on the Hellespont, has two ports, numerous fountains and mosques; and its merchants, comprising men of all nations, carry on flourishing trade in grain, wine, oil, etc. The exports have an annual value of over \$1,000,000; the imports, of \$750,000. G. is the see of a Greek bishop. In the town and neighborhood are many remains of ancient sculpture and architecture, the most noteworthy of which are the magazine and cellars built by Justinian. The town was taken by the Turks 1357, and formed their earliest European possession. Pop. abt. 20,000.

GALLIP'OLI, PENINSULA OF (anc. Thracian Chersonesus): portion of the province of Adrianople, European Turkey, between 40° 3' and 40° 38' n.; separating the strait of Dardanelles on the e. from the Gulf of Saros on the west. It extends s.w. about 55 m., varying from 4 to 13 m. in breadth. The principal town on the peninsula is Gallipoli (q.v.).

GALLIPOLIS, *gāl-lī-po-līs'*: city, cap. of Gallia co., O.; on the O. river; s. terminus of the G. McArthur and Columbus railroad; midway between Pittsburg and Cincinnati, 56 m. s.e. of Chillicothe. It is above high water mark, and contains a court-house, 10 churches, 1 national bank (cap. \$50,000), 1 state bank, Gallia Acad., high and 16 grammar schools, woolen and planing mills, foundries and furniture factories, 3 newspapers. G. was settled by the French. Was an important depot of supplies during civil war. Pop. (1890) 4,550; (1900) 5,432.

GALLIPOT, *ga-lip-pot* [Dut. *gley*, clay, *gley-pot*, earthen pot]: painted and glazed pot or vessel, commonly used by druggists to contain medicine.

GALLISSONNIERE, *ga-le-son-yer*, **ROLAND MICHEL BARRIN**, Marquis de la, 1693, Nov. 11—1756, Oct. 26, b. Rochefort; gov. gen. of Canada. He entered the French navy 1710, rose to the rank of capt., and was appointed gov. gen. of Canada 1745. He made friends with the Indians, planned and established a line of forts and trading stations between Canada and La., had a variety of trouble with the English in the O. valley and Nova Scotia, and returned to France 1749. He was promoted to the rank of chief of squadron, and was several years in charge of the bureau of maps and charts, where he performed much valuable scientific work. In 1756 he defeated the English admiral Byng off Minorca, then blockaded by the French. Byng's failure to relieve the place led to his being shot under sentence of the court, and G.'s health was so impaired by the excitement of the engagement that he was compelled to resign, and soon died.

GALLIZIN, or **GALYZIN**: see **GOLITZIN**.

GALLIUM, *gal-li-um* named in honor of France; metal, discovered 1875 during the spectroscopic examination of zinc-blende. In blende from some German mines there are 16 milligrammes of G. to the kilogramme. It is grayish white, crystallizes as an octahedron, is very hard, and but slightly malleable or flexible. It melts at 86.27°. The liquid metal is silvery white. The symbol is Ga; atomic weight, 63.

GALLIWAT, *gall-i-wat*: large rowboat, formerly in use still to some extent, used in eastern waters. They rarely exceed 70 tons, carry two masts with high triangular sails, and are generally armed with a few small swivel guns fastened on the bulwarks. The Malay pirates employ these swift but fragile vessels and engage in the trade which is the bane of the coast.

GALLIWASP, *gall-i-wasp*: *Crotalus obovatus*, small lizard, family *Scincidae*, found in the W. Indies. It is the object of terror to the inhabitants, but is really harmless.

GALLOMANIA, *gal-lo-ma-nia*: imitation of French literature and customs prevalent in Germany in the time of Frederick II. of Prussia, and developed in the writings of Wieland to a most glaring extent.

GALLON, *gal-lon* [Sp. and *Of. galea*, a Gallian jar], an earthen jar]: liquid or dry measure containing four quarts [standard measure for liquids in the United States, and the standard liquid and dry measure in Great Britain]. It has been in use from the earliest times, and in consequence has undergone many changes. In the time of Henry III. it was directed that there should be 8 lbs. of 12 ounces each, an ounce being the weight of 640 dry grains of wheat from the middle of the ear. In 1650, there were three distinct measures: 1, the G. measure in common use, which contained about 231 cubic inches; 2, the customary standard of the Guildhall, which though

MOON-GALLOTTANNIC

In 1826 Jan. when the above mentioned act came into operation, all these measures were abolished, and it was enacted that the standard measure of capacity for all liquids and for dry articles not measured by heaping, shall be a G. containing 10 lbs avoird. of distilled water, weighed in air (the barometer being at 30 inches, and the thermometer at 62°). This gives 277.274 cubic inches for the imperial G. and by subdivision or multiplication of this standard, the other measures can easily be found. See

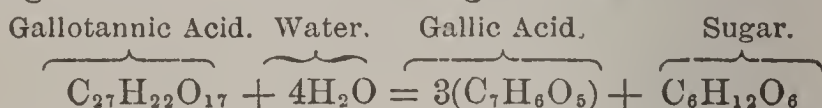
GALLOP *n.* *gal'lop* [*F. galoppe; It. galoppare; to gallop*], imitative of the sound of the footfall of a horse repeated at regular intervals—from old Flem. *galop*, a gallop; the swift forward movement of a horse or other animal by springs or leaps; the quickest pace of a horse; *V.* to move forward swiftly, as a horse. **GALLOPING** *imp.* [*ADP. rapid*]. *N.* the act of, **GALLOPED** *pp.* [*ADP. GALLOPER*], *n.* *-er*, one who. **GALLOPADE**, *n.* *-lo-pad* [*F. galopade*], a sidelong kind of gallop; a dance, and the music appropriate to it. **GALLOP-DANCE**, *n.* the act of dancing a gallopade; *v.* dancing a gallopade; moving about briskly. **HAND-GALLOR**, a gallop, but not at full speed.

GALLOTANNIC ACID, *găl-lo-tăn'ik* ($C_{12}H_8O_{10}$), the most important of the various forms of tannin or tannic acid. It occurs usually as a spongy, light inodorous, colorless or faintly yellow mass, easily reduced to a fine powder, which has a strongly astringent, but not bitter, taste. It is freely soluble in water; the solution reddening litmus paper and dissolving the carbonates with effervescence. With the per salts of iron Gr. A. gives a blackish-blue precipitate of gallotannate of iron, and even when the iron

GALLOTANNIC ACID.

solution is extremely dilute, a violet tint is evolved. This gallotannate of iron is the basis of ordinary writing ink (q.v.); and the reaction described is so sensitive, that G. A. is used in the laboratory as a test for the detection of the persalts of iron. G. A. precipitates likewise tartar emetic, nearly all the vegetable alkaloids (morphia, quinia, etc.), the albuminates, and gelatine. If a piece of raw hide, freed from hair, be immersed in a solution of G. A., the gelatigenous tissue and the acid combine, and leather is formed; and if the skin be of sufficient size, all the G. A. is removed from the solution.

G. A. fuses when exposed to heat, and at a temperature of about 120° it is decomposed, and yields pyrogallic acid ($C_6H_6O_3$) and metagallie acid ($C_6H_4O_2$), while water and carbonic acid are expelled. When a watery solution of G. A. is excluded from the air, it remains unchanged; but if the air is allowed free access, a fungous or moldy growth is developed, oxygen is absorbed, carbonic acid is given off and the G. A. becomes decomposed into Gallic Acid (q.v.) and sugar. The same decomposition is more rapidly induced by the action of dilute sulphuric acid, the reaction being exhibited in the following formula:



On boiling G. A. in a concentrated solution of potash, gallic acid is also formed.

The composition of the salts of this acid is imperfectly known, but the acid is generally considered as tribasic. None of the salts crystallize, and when in solution or in a moist state, they rapidly absorb oxygen, and become decomposed.

G. A. occurs in large quantity in the gall-nut, which contains, according to Pelouze, as much as 40 per cent. of this acid, and 3.5 per cent. of gallic acid (Guibourt has found that some nuts contain as much as 65 per cent. of G. A.) it is found likewise in all parts of the gall or dyer's oak (*Quercus infectoria*), in sumach (*Rhus coriaria*), and in green tea. The best method of obtaining it is from powdered gall-nuts, by extraction with commercial ether (which contains about 10 per cent. of water), in the percolation or displacement apparatus.

G. A. is employed in medicine, chemistry, and the arts. Its uses in medicine are due to its powerful astringent action. It is used topically as a styptic in wounds, bleeding gums, piles, etc., and internally as an astringent in hemorrhage from the lungs, stomach, bowels, etc.; as we know that it becomes converted into gallic acid in its passage through the system, it is probably the latter acid which acts on remote parts when G. A. is administered. Internally, it may be given in doses of three to ten grains, three or four times a day, in pills or in solution. It may be used as an astringent gargle or lotion, in the form of a watery solution containing three or more grains to the ounce. The compound ointment of galls, the best topical

GALLOW—GALLOWAY-DIKE.

remedy for piles without hemorrhage, owes its efficacy to the G. A. in the powdered galls. In chemistry, it is used in solution as a test for gelatine, persalts of iron, etc.; and in the arts, it serves various useful processes, especially in the preparation of leather, and the manufacture of white wines. Schiff assigns it the formula $C_{14}H_{19}O_9$.

GALLOW, *v.* *gǎl' lō* [A.S. *agælwian*, to astonish]: in *OE.*, to frighten; to terrify. **GAL'LOWING**, *imp.* **GALLOWED**, *pp.* *gǎl' lōd*.

GALLOWAY, *n.* *gǎl' lō-wā*: the name for a species of horse under 14 hands high, first bred in *Galloway* in Scotland.

GALLOWAY, *gǎl' lo-wā*: ancient province in the s.w. of Scotland, now mostly comprised in the shire of Wigtown and stewartry of Kirkcudbright. The extent and early history of G. are obscure. Gallwegia is mentioned 1124, in a charter granted by David I. of Scotland to the monks of Selkirk, and at that time its dimensions appear to have been no larger than those that the modern name implies. Of the eight tributary princes said to have waited on Edgar king of England at Chester, 973, one was 'Jacobus rex Galwalliæ.' The name, however, must have come into use after the time of Bede the historian (died 735), for in speaking of the province, which then formed part of the Bernician or Northumbrian kingdom, he makes no mention of it. Its origin is doubtful, but has obvious reference to the Gaelic people by whom it was possessed. The original inhabitants of the country appear to have been of Celtic origin; they are believed to have formed two distinct tribes, the Selgovæ and Novantes—the former holding the country e. of the Dee, with a portion of Dumfriesshire, while the latter held the portion lying west. After the departure of the Romans, in the first half of the 5th c., G. was overrun by the Anglo-Saxons of Northumbria, by whom, however, the native Celtic inhabitants do not appear to have been ever thoroughly subdued. About the 12th c., G. is spoken of by English writers as 'the land of the Picts,' and its inhabitants as 'the Picts.' In Scottish charters, the inhabitants were called simply 'Gallowidienses,' or men of Galloway. G. was ruled by its own princes, the kings of Scotland exercising only a nominal sovereignty over it, and it was not until the reign of Alexander II. that the power of these great chieftains was completely broken by the crown. The last of them, Alan of Galloway, constable of Scotland, died 1233, when his great possessions were divided among his three daughters. See Skene's *Celtic Scotland* (1876). See **KIRKCUDBRIGHTSHIRE**: **WIGTOWNSHIRE**.

GAL'LOWAY, **MULL OF**: rocky headland, s. extremity of the peninsula called the 'Rinns of Galloway, in Wigtownshire; the most southern point of Scotland. It is $1\frac{1}{2}$ m. long, and $\frac{1}{4}$ of a mile broad. On this headland, lat. $54^{\circ} 38'$ n., and long. $4^{\circ} 52'$ w., is a light-house, 325 ft. above the sea, where light is visible 21 nautical miles.

GALLOWAY-DIKE: a wall built firmly at the bottom,

but not thicker at the top than the length of the single stones, closely piled the one above the other, etc. in the A. G. etc. to the

GALLOWGLASS, n. *gal'lo-glass* [Fr. *gallowglass*, a servant. Gael. *gal'le-choss*, a foot-soldier]: formerly, an Irish heavy armed foot soldier; a heavy ax used by him.

GALLOWS, n. *gal'loz* [Goth. *galga*, Ger. *galgen*, a cross: Icel. *galgt*, gallows, a gallows: A comp. Gael. *gal'lan*, a branch]: two upright posts, with a crossbeam on top, from which criminals are hung; one who deserves to be hung on the gallows; in *Scot.* and *prov. Eng.*, braces for limbs. **GALLOWSDREE**, [the gallows,] or the wood for it. **GALLOWSBITS**, on vessels, two strong frames of oak, for which the spare topmasts and yards are launched. **PIT AND GALLOWS**: see *FOSSA ET FURCA*. **EXECUTION: HANGING**.

GALLIES, see *GALLIACEOUS BIRDS*. **GAULOCH** or **GALOSHE**, n. *ga'losh* [Fr. *galoche*, a clog: OE. *gahulle*, a wooden sole fastened by a strap to the foot]: a covering of caoutchouc or leather for keeping the feet dry in wet weather: now, more frequently called **GOLOSH** (see **GOLOSHES**).

GALOIS, *ga'loz*, EVARISTE, 1811, Oct. 26—1832, May; b. France: mathematician. Scarcely anything is known of his education and early life, but it is probable that he was exceedingly precocious in mathematics, as in a career of less than 21 years he went beyond the results of Lagrange, Gauss, and Abel in attempts to perfect the algebraical solution of equations by radicals, and left an original treatment of the theory of numbers, which has been recognized as of the highest value to science. All that is known of his last years is that he was killed in a duel.

GAFORE, ad. *ga'lor*, and **GOLORE**, ad. or **GALLORE**, ad. [Gael. *gu'lor*, for *teor*, or *teor*, sufficiency]: in *Scot.* and *prov. Eng.*, in abundance; in great plenty.

GALURET, n. *ga'lor-et* [Fr. *galure*, small flute of primitive character, with three holes, similar to the pique pipe].

GALT, *ga'lt*, town of Canada, province of Ontario, on Grand River, 53 miles from Lake Erie. The town and parts of the town are both connected by two wooden bridges. The environs are noted for beauty. The first house was built 1816, amid a dense forest of pines. The inhabitants are largely of Scotch descent. There are numerous places of public worship, in Presb. Meth. Episc. Rom. Cath. and Bapt. A free common school has an average attendance about 1500; there is also a grammar school, and an extensive library and public reading room in connection with a mechanics' institute. Among the industrial establishments are woolen manufactories and iron foundries; also extensive flour mills. The manufacture of edge tools is an important industry. A branch of the Great Western railway passes through Galt. The local affairs are managed by a mayor and council of 15 members. Pop. (1881) 7,533; (1901) 7,866.

GALT, Sir ALEXANDER TILKHOE, b. Chelsea, England, 1817; son of John G., who was a Scotch novelist. Sir Alexander was manager of the *British-American Land*

GALT, James, was active in establishing the railroad from Montreal to Portland; was twice Canadian minister of finance; and 1880 acted as high commissioner for Canada in Great Britain. He d. 1897, Sep. 19.

GALVAN, John, b. 1779, May 2, 1839, Apr. 11; b. Irvine, Scotland; novelist. His father was capt. of a ship in the W. India Company. He received his education in Greenock, and having read which was his first book, he printed, but afterward he sold it in a market, for his health he sought a more genial climate, and at Gibraltar, made the acquaintance of Lord Byron, and his first success in the *English* was his *Scottish Brethren*, and his friend Mr. Hobhouse; and that the Travellers became fellow-travellers for a time. He also became acquainted with Byron, and then proceeded to Constantinople, and to the shores of the Black Sea. In 1820, he published *Letters from the Tropic Land*, and in 1821, *The Assyrian Legation*, in *Blackwood's Magazine*, and in 1822, *The Arabian Nights*, a far superior work, in the following year, had great success. In the same vein, he published *The Arabian Nights*, *The Arabian Nights*, and *The Arabian Nights*, with great rapidity. Various historical romances, which were of less interest. He was enthusiastic in the formation of the Canada Company; and in 1836, he departed, but, disappointed, he returned to England after a year or two, and published *The Arabian Nights*, and *The Arabian Nights*, and *The Arabian Nights*. He returned to Scotland, broken in health, and died at Greenock. He was an unequal writer; and his gift for depicting provincialism, and life as it is, in small towns and villages—communities in which the successful shop-keeper may aspire to be the most distinguished man in which the minister is the most popular personage. His son became known as a Canadian author.

GALVANI, Giovanni, b. 1737, Sep. 9—1798, Dec. 4; b. Duddleston, Edgland, 1822, cousin of Charles Darwin. He was educated at King Edward's School, Birmingham, and King's College London, studied medicine, and graduated at Trinity College, Cambridge, 1844. In 1846 he traveled through N. Africa and on the White Nile, 1850 assisted in exploring the unknown Demara and Ovampo lands in S. Africa, and soon after entered the British civil service in the board of trade. He has been an officer and member of many scientific societies; and, has published *Narrative of an Explorer in Tropical South Africa* (1853), for which he received the gold medal of the Royal Geographical Soc.; *Art of Travel; or Shifts and Contrivances in Wild Countries* (1855, 5th ed. 1872); *Meteorographica* (1863), the first attempt to chart the progress of the elements of the weather and establish the existence and theory of anti-cyclones; *Hereditary Genius; its Laws and Consequences* (1879); *English Men of Science; their Nature and Nurture* (1874); and *Inquiries into Human Faculty and Development* (1883).

GALVANI, gál-vá'nē, Luigi; 1737, Sep. 9—1798, Dec. 4;

b. Bologna, Italy: physician and anatomist. Intending to devote himself to a monastic life, his studies in the Univ. of Bologna were directed to scholastic philosophy rather than to general science. The influence of friends turned him to the profession of medicine; and he selected especially the departments of physiology and comparative anatomy, studying under some of the most eminent medical professors of the day—Beccaria, Tacconi, and Galeazzi whose gifted daughter he subsequently married. He soon gained distinction and 1762 was elected prof. of anatomy in the institute of his native city. His lectures, though not remarkable for eloquence, were clear, accurate, and comprehensive. His writings are not numerous, but all are characterized by rare precision and minuteness of details. Two treatises, which added considerably to his reputation, are—*Considerations on the Urinary Organs*, and *On the Organs of Hearing of Birds*. But to a purely casual discovery G. owes the wide celebrity attached to his name. Many versions of this occurrence have obtained credence; but the simple fact seems to be, that G.'s wife, a woman of penetrating intellect, happened one day to witness with surprise the convulsive muscular movements produced in a skinned frog by its inanimate body having been accidentally brought into contact with a scalpel which lay on the table, and had become charged by contact with an adjoining electrical machine. She hastened to communicate the interesting phenomenon to her husband, who at once instituted a prolonged series of experiments: see GALVANISM: ELECTRICITY, ANIMAL. Some time before G.'s death he had lost his wife and had been deprived of all his public emoluments in consequence of his refusal to take the oaths prescribed by the Cisalpine Republic, of which Bologna then formed a part. His writings have mostly been published in the memoirs of the Bologna Institute of Sciences, including the most remarkable production of his pen, the treatise *De Viribus Electricitatis in Motu Musculari Commentarius*.

GALVANISM.

GALVANISM, n. *găl'văn-iz-m* [from *Galvani*, of Bologna, the discoverer]: the electricity developed from the chemical action which takes place from certain bodies placed in contact, as from two plates of dissimilar metals (see below). **GAL'VANIST**, n. *-ist*, one who studies galvanism. **GAL'VANOL'OGY**, n. *-ôl'ô-jî* [Gr. *logos*, a discourse]: a treatise on. **GAL'VANOL'OGIST**, n. one who writes on. **GALVANIC**, a. *găl'văn'ik*, of or pertaining to galvanism; also **GALVAN'ICAL**, a. *-î-kăl*. **GAL'VANIZE**, v. *-văn-îz*, to affect with galvanism. **GAL'VANIZING**, imp. **GAL'VANIZED**, pp. *-îzd*. **GALVANOG'LYPHY**, n. *-og'li-fî* [Gr. *gluphō*, I hollow out, I engrave]: process of engraving in which the ground is spread on a clean zinc plate and etched. Succeeding coats of varnish are spread by a roller on the ground, avoiding the obliteration of the lines, which become deeper with each coat. The finished plate becomes a matrix for a reverse impression obtained in the electro-bath, and this reverse is used to print from in the ordinary manner. **GAL'VANOM'ETER**, n. *-ôm'ê-têr* [Gr. *metron*, a measure]: an instrument for detecting currents of electricity and estimating their amount. **GALVAN'OSCOPE**, n. *-ô skôp* [Gr. *skôpêō*, I examine or view]: an instrument for detecting slight currents of electricity. **GALVANIC BATTERY**, an apparatus for generating and accumulating galvanism. **GALVANIZED IRON**, iron, generally sheet-iron, covered with zinc by a peculiar process. **GAL'VANOG'RAPHY**, n. *-ôg'rá-fî* [Gr. *graphê*, a writing]: a modern process by means of which objects of wood, stone, metal, etc., and coins, plaster-casts, copperplates when engraved, etc., may be exactly copied in copper; also called **ELECTROG'RAPHY**: see **ELECTROTYPE**, under **ELECTRIC**.—*Galvanism* is a branch of the science of electricity treating of the electric currents arising from chemical action, particularly from that attending the dissolution of metals. It is sometimes called **Dynamical Electricity**, because it deals with current electricity or electricity in motion, and is thus distinguished from **Frictional Electricity** (see **ELECTRICITY**), which is called **Statical** in consequence of its investigating the electric condition of bodies in which electricity remains insulated or stationary. These terms, though in the main thus properly applied, are in all strictness applicable to both sciences. Frictional electricity, though small in quantity, can pass in a sensible current, and galvanic electricity, though small in tension, can be made to manifest the attractions and repulsions of stationary electricity. Thus the series of discharges transmitted in a wire connecting the prime conductor of a machine in action with the ground, possesses, though feebly, the characteristics of a galvanic current; and the insulated poles of a many-celled galvanic battery manifest before the current begins the electric tension of the friction machine. See **ELECTRICITY**.—For the other branches of current electricity, see **INDUCTION OF ELECTRIC CURRENTS**: **MAGNETISM**.

Historical Sketch.—The science of G. dates from the close of the 18th c. In 1780 Galvani (q.v.) in making in-

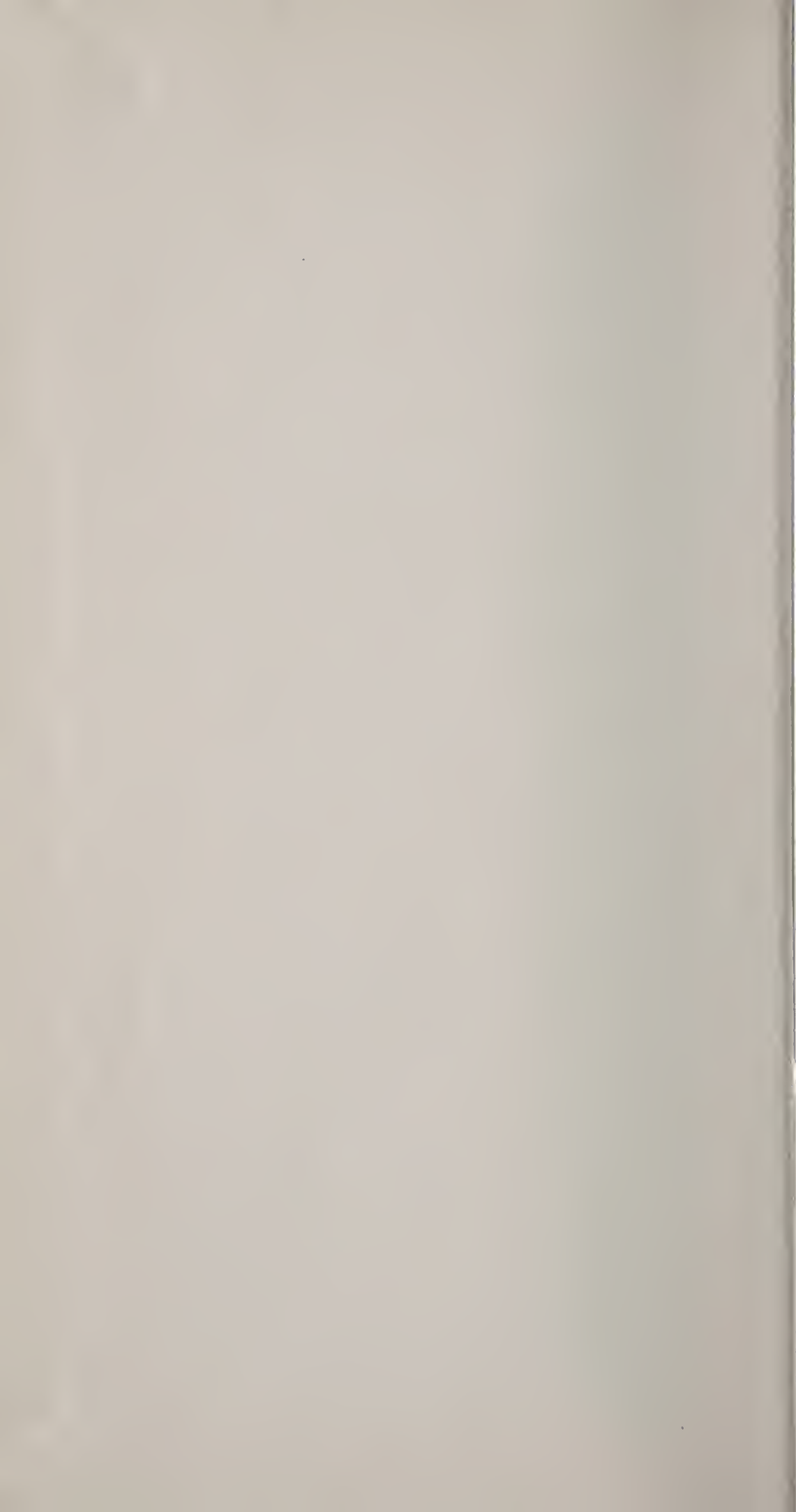
investigations on the nervous irritability of cold-blooded animals, discovered, by accident, that the limbs of a recently killed frog, when hung by the spinal nerve on a metal support near an electric machine, were convulsed convulsively at the appearance of each spark. This he properly accounted for by the back-stroke. Six years after, (1786), in experimenting on reticulated electrically with frog limbs, as delicate electroscopes, he obtained, also accidentally, the same convulsions by bringing the copper hook on which the nerve hung, and the limb itself, simultaneously in contact with an iron rod. The similarity of the result led him to attribute it to the same cause, viz. electricity, neither existing in the limb itself, nor produced in the conducting instrument. On consideration, he adopted the former hypothesis, regarding the limb as a self-charging Leyden jar, with silver wires the brass knob and wire at the interior of the muscles as the inner coating, and the exterior the outer coating, and the metal arc as the discharging tongue. He published this researches in the *Yolta* of 1791, in which he discarded the account given by Galvani of his Experiment, and from the fact, that the convulsions were excited in a weak place, with more energy when the de wire was in contact with the conducting wire, instead of being attributed to the source of electricity, to the heterogeneity of the metal employed. He maintained that, at the surface of contact of two different metals, an electric fluid was generated, and that the difference in the tension of the two different fluids, was the cause of the contact electricity. This doctrine, however, is in contradiction to the principle of the contact electricity, which is in accordance with Volta's theory. Galvani proved, in consequence, that the contractions in the limbs of the frog, on the plates of the only metal as employed, and even when the plate of the battery was not in contact with the metal. Subsequent discovery has proved Galvani partly right in attributing the cause of these contractions to animal electricity, also Volta partly right in attributing them to the electricity generated in the metal, and for both causes may be shown to produce the results. Volta's theory of contact electricity is maintained, although another theory obtained needless support, which attributes the source of galvanic electricity to the chemical action of a liquid on two metals brought in contact. With another metal less easily acted on than itself, as *Platina*, *platina*, *platina*, was the first (1792) to suggest the chemical action of one of the causes of Galvani's experiment. Volta did not accept of Galvani's theory, and publicly disapproved his theory by several apparently conclusive experiments. In 1791, he constructed a series of experiments, so evident of the truth of his reasoning, his plan, and with it properly began the history of galvanism. He found that the same effect of electricity to Volta is due to the same cause: playing on it as a source of power, on the available importance, and which, but for his genius, might have been obtained among the other sciences of the day. Among the more distinguished of the Galvanic theorists are Volta,

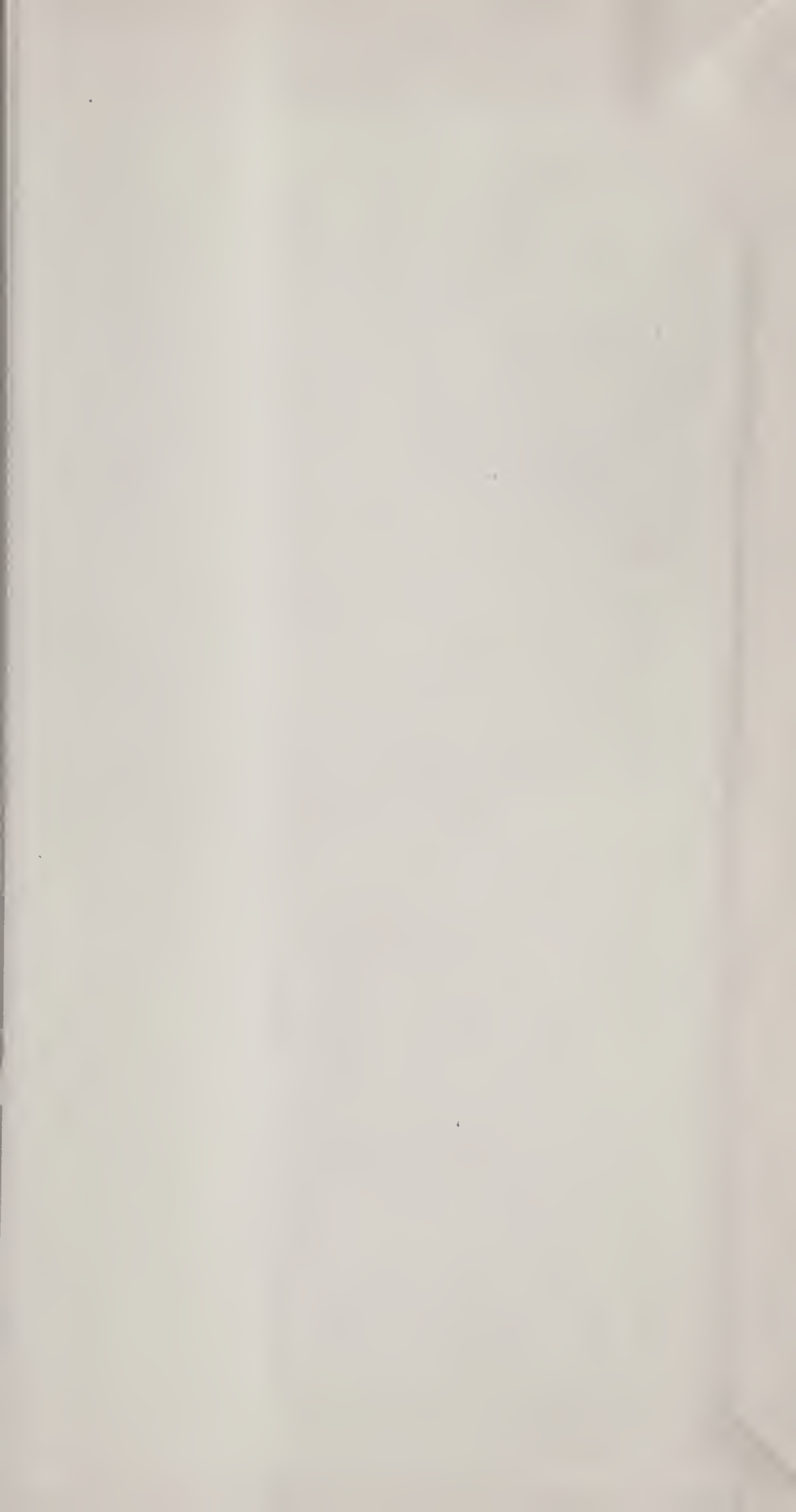
GALVANISM.

Ritter, Pfaff, Biot, Deluc, Ohm, and Fechner; and among the chemical theorists, Fabroni, Davy, Wollaston, Parrot, De La Rive, and Faraday. Davy latterly maintained a theory of distribution and equilibrium of electricity midway between the two, which numbered among its supporters Jæger, Berzelius, Hermann, and Precht. Recently (1860 onward), Sir William Thomson has given what he considers convincing proofs of Volta's contact theory, but he modifies the theory so far as to make it consistent with the conservation of energy.—See **ELECTRICITY**.

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